P 442   **[4064] - 102**

B.E. (Electronics)
ELECTRONIC PRODUCT DESIGN
(2003 Course) (Sem. - I) (404202)

Time : 3 Hours]   *[Max Marks : 100*

Instructions to the candidates :

   1)   Answer any three questions form each section.
   2)   Answers to the two sections should be written in separate books.
   3)   Neat diagrams must be drawn wherever necessary.
   4)   Figures to the right indicate full marks.
   5)   Use of electronic pocket calculator is allowed.
   6)   Assume suitable data, if necessary.

SECTION I

Q1) a)   Explain the Bathtub curve for reliability indicating all its region.**[6]**

   b)   State the various design considerations for microprocessor based system. **[6]**

   c)   What are the different types of transient suppressors ? Discuss briefly the selection criteria for transient suppressor. **[6]**

OR

Q2) a)   What are the objectives of providing shielding & explain the different levels of shielding. **[6]**

   b)   State & explain the different types of energy coupling mechanisms with suitable schematic. **[6]**

   c)   Explain how ergonomic & aesthetic design considerations are taken care in case of digital multimeter. **[6]**

Q3) a)   Explain the main factors to be considered for signal conductors in following circuits- **[8]**

   i)   High frequency amplifiers & oscillators.

   ii)   High gain DC amplifiers.

b) Estimate the parasitic values for following geometries of printed circuit tracks - **[8]**

   i) Resistance of 10 cm long copper track with 0.8 mm width on standard 35 micron copper clad laminate.

      [Assume resistivity of copper $= 1.72 \times 10^{-6} \Omega - cm$]

   ii) Inductance of track on PCB with 1mm width, 25 cm length & 70 microns thickness.

OR

Q4) a) List the EMI/EMC considerations in PCB designing. Explain how will you minimize the spreading of RF in multilayer PCB. **[8]**

   b) Calculate the characteristic impedance of - **[8]**

      i) Strip line geometry when the PCB laminate thickness is 1.6 mm & its relative permittivity is 4.2. The width & thickness of embedded track are 1 mm & 35 microns respectively.

      ii) What should be the width of track for micro strip geometry which will provide $z_o = 50\Omega$, when the PCB laminate thickness is 1.6 mm, relative permittivity is 4.2 & thickness of track is 70 micron.

Q5) a) Compare simulation with prototyping. **[4]**

   b) State the different capabilities of MSO. **[4]**

   c) Explain the use of storage oscilloscope for the measurement of set - up & hold time of a D-flip flop using CMOS IC. Give range settings for various controls & draw the expected waveforms. **[8]**

OR

Q6) a) Explain how simultaneous state & timing mode of logic analyzer helps in fault indication of high speed digit designs. **[5]**

   b) State & briefly explain the different issues to be considered in ensuring signal integrity in high speed circuits. **[5]**

   c) Explain the use & limitations of DC & AC analysis by using any one circuit. **[6]**

SECTION II

Q7) a) State the various goals of software design. **[5]**

b) With the help of neat diagram explain the different phases of software design. **[5]**

c) Explain with the help of real life μ p/μ c based product how all recommended steps in a software development are implemented. **[8]**

OR

Q8) a) Explain the factors that determine the choice between developing software for process control instrument in - **[8]**

    i) assembly language,

    ii) High level language.

b) Write notes on - **[10]**

    i) Compiler

    ii) Emulator

    iii) Simulator

    iv) Assembler.

Q9) a) Explain the different types of temperature tests to be carried out on an industrial product. **[8]**

b) Specify with justification the choice of environmental tests to be carried out on - **[8]**

    i) Laptop

    ii) ECG Machine

    iii) Mobile

    iv) TV.

OR

Q10) Consider the following products - **[16]**

    i) Welding machine

    ii) MRI machine

    iii) Relay operated controller

    iv) Conveyer belt.

a)   Classify the product according to their electromagnetic environment.

b)   Explain whether the emission tests or susceptibility to EMI will be important.

c)   Explain the mechanism by which the product is either a case for EMI/EMC or not.

d)   Which EMI/EMC tests should be conducted on these products.

Q11) a)   What are the different forms of documentation is to be prepared by the PCB designer for PCB design.   **[8]**

b)   Explain in detail -   **[8]**

i)   User manual for DVD player.

ii)   Application manual for software product.

OR

Q12) a)   With a suitable example explain how bill of material is prepared for a product.   **[8]**

b)   Give reasons -   **[8]**

i)   Multi-layer PCB's must be used for ICS packaged as PLCC.

ii)   It is not advisable to use general-purpose PCBs for development of a μp/μc based circuit.

iii)   Bare board testing is essential for PCBs with high track density.

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P 443   **[4064] - 103**

B.E. (ELECTRONICS)
ADVANCED POWER ELECTRONICS
(2003 Course) (Sem. - I) (404203)

Time : 3 Hours]   *[Max Marks : 100*

Instructions to candidates :

1) *Answer Q1 or Q2, Q3 or Q4, Q5 or Q6 from section I and Q7 or Q8, Q9 or Q10, Q11 or Q12 from section II.*
2) *Answers to the two sections should be written in separate books.*
3) *Neat diagrams must be drawn wherever necessary.*
4) *Figures to the right indicate full marks.*
5) *Use of logarithmic tables, slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.*
6) *Assume suitable data, if necessary.*

SECTION-I

Q1) a) With the help of neat circuit diagrams and relevant waveforms, explain the operation of a three-phase full converter for R and level (highly inductive) loads. **[10]**

b) A three-phase full converter operates from the 380V, 60Hz mains and charges a battery bank through a large filter inductance. If the battery voltage is 360V and the sum of the resistance of the filter inductance and the battery internal resistance is 18_Ω, calculate for a firing angle of 15°: **[8]**

   i) Average (DC) load voltage

   ii) Average (DC) load current
   iii) RMS line current
   iv) Battery charging power
   v) Power supplied from the mains assuming the converter to be lossless.

OR

Q2) a) Why are dual converters important? With the help of a neat circuit diagram and relevant waveforms, explain the operation of a single-phase circulating mode dual converter. **[10]**

P.T.O.

b) With the help of a neat circuit diagram, explain the technique for achieving equal voltage sharing of two series connected diodes. Derive the relationship between the current sharing resistors in terms of the diode parameters. **[8]**

Q3) a) With the help of a neat circuit diagram, relevant waveforms and mode equivalent circuits, explain the operation of a three-phase,180° mode, voltage source inverter feeding a balanced, star-connected resistive load. Also derive an expression for the RMS line output voltage.**[10]**

b) The above inverter operates from a 400V DC supply and feeds a balanced, star-connected resistive load of 10Ω per-phase. Calculate
   i) RMS line-to-line output voltage
   ii) RMS SCR current
   iii) Load power **[6]**

OR

Q4) a) Draw the circuit diagram, relevant waveforms and mode equivalent circuits of a three-phase ASCSI feeding an induction motor load. Also derive an expression for the peak commutation capacitor voltage in terms of the CSI current, operating frequency, and motor back emfs (assumed constant during the commutation process.) **[10]**

b) Briefly explain any one technique for output voltage control and harmonic reduction in inverters? **[6]**

Q5) a) Draw the circuit diagram and waveforms of supply voltage, load current and supply current for a single-phase AC-to-DC converter feeding a level load and operating under Symmetrical Angle Control. Also derive an expression for the rms n^{th} harmonic supply current.
[10]

b) With the help of suitable diagrams explain the working principle of DCCT for DC current measurement in converters and inverters. **[6]**

OR

Q6) a) With the help of a neat circuit diagram, relevant waveforms including capacitor (switch) voltage & inductor (load) current and mode equivalent circuits, explain the operation of a class E resonant converter. **[10]**

b) Compare resonant converters with switched-mode converters? **[6]**

SECTION-II

Q7) a) Compare a DC motor with a typical stepper motor for the following performance parameters: **[6]**

    i) Generated shaft torque,

    ii) Rotor inertia,

    iii) Motor speed and possible variation,

    iv) Power output efficiency.

    b) Explain half-stepping & micro-stepping modes of operation for stepper motors. **[8]**

    c) What is the role of tachogenerator OR pulse encoder in a typical DC motor control drive? **[4]**

<div align="center">OR</div>

Q8) a) With the help of a neat circuit diagram and relevant waveforms, explain the operation of a single-phase LCC based separately excited DC drive having a full converter in the armature circuit and a semi-converter in the field circuit. Also derive an expression for the motor speed in terms of armature converter firing angle, field converter firing angle, motor torque and supply voltage. **[10]**

    b) A 230V, 1200rpm, 20A separately excited DC motor with $R_a = 0.5\,\Omega$ and $K_{af} = \dfrac{11}{2\pi}V/$ rad/sec, is fed from a single-phase full converter operating from the 230V, 50Hz mains. Speed variation below base speed is obtained by armature voltage control. Assuming continuous armature and field currents, calculate. **[8]**

    i) The firing angle to get rated motoring torque at 900rpm.

    ii) The firing angle to get rated breaking torque for regenerative braking at 60% of rated speed (in the opposite direction).

    iii) The motor speed (in the opposite direction) to get rated breaking torque under regenerative braking for a firing angle of 150º.

Q9) a) With the help of the appropriate torque-speed characteristics, explain how electromagnetic braking is achieved for three-phase induction motors fed from a constant V/ f variable voltage variable frequency drive. **[8]**

b) A 4 pole, 380V, 60Hz, three-phase induction motor has a rated speed of 1740rpm. Calculate its speed, slip and slip frequency when it is electromagnetically braked under constant V/ f control with a stator frequency of 40Hz, the braking torque being equal to 75% of rated motor torque. **[8]**

OR

Q10) a) With the help of a neat circuit diagram and relevant waveforms, explain the operation of a bipolar voltage chopper drive for PM & hybrid stepper motors. **[8]**

b) With the help of a circuit diagram and the motor torque-speed characteristic, explain stator voltage speed control of induction motors. **[8]**

Q11) a) Enumerate the different types of short-duration power-line voltage disturbances and explain any two in detail. **[12]**

b) Briefly explain how energy audit helps to control energy losses in industrial plants. **[4]**

OR

Q12) a) What do you understand by the term 'Energy Audit'? How is energy audit carried out in a typical industrial plant. **[12]**

b) Explain the origin and effects of voltage spikes and voltage dips relating to power line disturbances: **[4]**

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Total No. of Questions : 12]   [Total No. of Pages :3

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B.E. (Electronics)

PROCESS INSTRUMENTATION

(2003 Course) (404205) (Sem. - I) (Elective - I)

Time : 3 Hours]   *[Max Marks : 100*

Instructions to the candidates :

1) Answers to the two sections should be written in separate books.

2) Neat diagrams must be drawn wherever necessary.

3) Figures to the right indicate full marks.

4) Use of logarithmic tables slide rule,Mollier charts, electronic pocket calculator and steam tables is allowed.

5) Assume suitable data, if necessary.

SECTION I

Q1) a) What is meant by control system quality ? Explain any one method to evaluate the quality. **[8]**

b) With suitable example . Explain "Servo Problem" and "Regulator problem" in Process control. **[8]**

OR

Q2) a) With a neat sketch explain the working of an E/P Converter. Write its important specifications. **[8]**

b) Draw the block diagram of a SMART TRANSMITTER for flow Measurement and explain the function of each block. **[8]**

Q3) a) Sketch the following control valve actuators **[12]**

i) Spring Diaphragm actuator with positioner.

ii) Electropneumatic actuator.

b) What do you understand by the term "Valve Flow Coefficient" (Cv) for a control valve. How this term is related to valve sizing. **[4]**

OR

Q4) a) Draw the circuit of a PID controller using OPAMPs. Explain how the Proportional Band, Integral Time and Derivative Time are set in this. **[8]**

P.T.O.

b) What is meant by "Tuning of Controllers" ? What is its Significence. Explain the Zeigler-Nichols Method for tuning a controller.   **[8]**

Q5) a) Explain with block diagram.   **[12]**

  i)   Model Reference Adaptive Controller.
  ii) Self Tuning Controller.

  b) Write short note on "Statistical Process Control".   **[6]**

OR

Q6) a) Draw the P & I Diagram and write the specifications of the instruments used in the following control schemes.   **[12]**

  i)   Three element control of Boiler Drum level.

  ii) Feedforward control of Heat Exchanger.

  b) Explain how selective control is used in a compressor control system for SAFETY.   **[6]**

SECTION II

Q7) a) Explain the Mathematical Dynamic Model for any Temperature Process.   **[10]**

  b) Explain different optimizing tools in Process control.   **[6]**

OR

Q8) a) With suitable examples explain the following terms.   **[10]**

  i)   Internal Model Control (IMC).
  ii) Process Model Based Control (PMBC).

  b) Explain the term "Feed forward Optimizing Control".   **[6]**

Q9) a) Draw the Event Sequence and Ladder Diagram for a PLC system for "Bottle filling System". Consider all sensors as direct inputs to PLC.   **[12]**

  b) Justify the statement "PLC is a sequence Controller".   **[4]**

Q10) a) Draw the Event Sequence and Ladder Diagram for a PLC system used as an "Alarm Annunciator". Consider all sensors as direct inputs to PLC. **[12]**

b) Define the following terms with reference to a PLC. **[4]**

   i) I/O Scan mode.

   ii) Execution Mode.

Q11) Write short notes on: **[3 × 6 = 18]**

a) Alarm Annunciator.

b) Square Root Extractor.

c) Classification of Control Panels.

OR

Q12) a) Draw the block diagram of a Direct Digital Control system and explain the function of each block. **[10]**

b) Explain the function of the following units in a Distributed Control System (DCS). **[8]**

   i) Local controllers.

   ii) Co-ordinating Computer.

   iii) Central Information Display.

   iv) Data Links.

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P447   **[4064]-107**

B.E. (Electronics)

ADVANCED DIGITAL SIGNAL PROCESSING

(Sem. - I) (2003 Course) (404205) (Elective - I)

Time : 3 Hours]   [*Max. Marks : 100*

Instructions to the candidates:

1) Answers to the two sections should be written in separate answer books.

2) Neat diagrams must be drawn wherever necessary.

3) Figures to the right indicate full marks.

4) Use of logarithmic tables, slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.

5) Assume suitable data, if necessary.

SECTION - I

Q1) a) Explain the sampling rate conversion of the discrete time sequence by a rational factor. **[6]**

b) An audio signal with a bandwidth of 4kHz is sampled at a rate of 8kHz. Aim is to isolate the frequency components below 80Hz with a filter that has passband $0 \leq F \leq 75Hz$ and a transition band $75 \leq F \leq 80Hz$. The signal is to be decimated by a factor of 50. The passband ripple is 10^{-2} and stopband ripple is 10^{-4}.

i) Design a single stage decimator

ii) Design a two stage decimator **[12]**

OR

Q2) a) Explain the polyphase filter of multirate system. **[8]**

b) A digital audio system exploits oversampling techniques to relax the requirements of anti imaging filter. System specifications are

Baseband : 0-20 kHz

Input sampling frequency: 44.1 kHz

Output sampling frequency : 176.4 kHz

δ_s :   50 dB

δ_p :   0.5 dB

transition width :   2kHz. **[10]**

Design a suitable two stage decimator.

Q3) a) Explain, the concept of adaptive filtering with the help of system identification configuration. **[6]**

b) Explain, how adaptive filter can be used in telephony for echo cancellation. **[10]**

OR

Q4) a) Derive the LMS adaptive algorithm. **[10]**

b) Write the algorithm for LMS adaptive filter. **[4]**

c) State the number of additions and multiplications required for the computation of one output sample, if the order of LMS adaptive FIR filter is P. **[2]**

Q5) a) An ARMA process has an autocorrelation function $r_{xx}(m)$ whose Z-Transform is given by **[6]**

$$P_{xx}(z) = \frac{4 - 17z^{-1} + 4z^{-2}}{1 - \frac{5}{2}z^{-1} + z^{-2}} \quad \text{ROC:} \quad \frac{1}{2} < |z| < 2$$

i) Determine the minimum phase filter H(z) for generating $x(n)$ from the white noise sequence

ii) Determine the whitening filter for sequence $x(n)$

b) Determine the prediction coefficients for the sequence whose autocorrelation function is given as {38 1 6 8 –8} **[10]**

OR

Q6) a) A WSS random process is given by $x(n) = s(n) + w(n)$
where $s(n)$ is given by $s(n) = 0.75\ s(n–1) + v(n)$ where $v(n)$ is a white noise process with $\sigma_V^2 = 0.51$ and $w(n)$ is a white noise process with $\sigma_w^2 = 1$. Assume that $v(n)$ and $w(n)$ are uncorrelated Determine the coefficients of FIR where filter of length 3. To estimate $s(n)$. Find the achieved MMSE. **[10]**

b) A 3 stage lattice filter has coefficients as $k_1 = \frac{1}{4}$, $k_2 = \frac{1}{2}$, $k_3 = \frac{1}{3}$

Determine the FIR filter coefficients of direct form structure. **[6]**

SECTION - II

Q7) a) Discuss the problems of estimating power spectral density of WSS random process. **[5]**

b) Explain the periodogram method of power spectrum estimation WSS random process. What are its limitations. **[8]**

c) State the effect of applying Bartlett window to *x*(n) in periodogram method. **[5]**

OR

Q8) a) Discuss the welch's method of power spectrum estimation of WSS random process. **[8]**

b) Suppose we have N=1000 samples from a sample sequence of random process.
   i) Determine the frequency resolution of the Bartlett, Welch (50%overlap) and Blackman-Tukey methods for a quality facor of 10.
   ii) Determine the record length (M) for Bartlett, welch (50%overlap) & Blackman Tukey methods. **[10]**

Q9) a) Discuss the desirable features required for a digital signal processor.**[10]**

b) Enumerate the features of TMS 320 C5416 digital signal processor.**[6]**

OR

Q10) Explain, with pseudo-code, the process of FIR filter on a digital signal processor based system. **[16]**

Q11) a) Explain any one method of pitch detection of a speech signal **[6]**

b) Explain the digital model of vocal tract. **[6]**

c) What is cepstrum. **[4]**

OR

Q12) a) With the aid of block diagram, explain the process of LPC coder and decoder. **[8]**

b) Explain how will you detect silence in a speech signal using energy and zero crossings. **[8]**

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P 448   **[4064] - 110**

B.E. (Electronics Engineering)
ELECTRONICS MEASUREMENT SYSTEMS
(404209) (2003 Course) (Sem. - II)

Time : 3 Hours]   *[Max Marks : 100*

Instructions to the candidates :

1)   Answer three questions from section I and three questions from section II.

2)   Answers to the two sections should be written in separate books.

3)   Neat diagrams must be drawn wherever necessary.

4)   Figures to the right indicate full marks.

5)   Assume suitable data, if necessary.

SECTION I

Q1) a)   With the appropriate example, explain the following terms.   **[8]**

      i)   Accuracy

      ii)   Precision

      iii) Linearity.

      iv)   Sensitivity.

  b)   Why calibration is required   **[2]**

  c)   Explain the calibration standards and traceability.   **[8]**

OR

Q2) a)   Explain the working of 'Q' meter with phase diagram and explain series connection method in Q-meter circuit.   **[10]**

  b)   Explain with the block diagram true RMS Voltmeter.   **[8]**

Q3) a)   Explain the working of digital frequency counter with block diagram. **[8]**

  b)   Explain how time interval measurement and frequency ratio measurement is carried out in frequency counter.   **[8]**

OR

Q4) a)   Draw the diagram and explain the prescalar technique to count higher frequencies.   **[8]**

b) What are the different errors that occurs in the measurement using frequency counter. **[8]**

Q5) a) Explain with the neat diagram frequency selective Wave Analyzer. **[8]**

b) Write different applications of Spectrum Analyzer. **[8]**

OR

Q6) a) With the help of block diagram, explain the function of Logic Analyzer. **[8]**

b) Explain with block diagram, working of Fundamental Supression Distortion Analyzer. **[8]**

SECTION II

Q7) a) Explain with the neat diagram 'SINAD' sensitivity test. **[8]**

b) With the suitable block diagram explain the elements of Network Analyzer System. **[8]**

OR

Q8) a) Explain the method of measuring selectivity of receiver. **[8]**

b) Write a note on vector Network Analyzer. **[8]**

Q9) a) Explain with the block diagram Digital storage Oscilloscope and write the applications. Of it **[10]**

b) Explain different sampling methods used in DSO. **[8]**

OR

Q10) a) List various types of CRO probes. Explain any two types in detail **[10]**

b) Explain following measurements on CRO. **[8]**

i) Voltage measurement.

ii) Current measurement.

iii) Phase difference measurement.

iv) Frequency measurement.

Q11) a) State and explain Virtual instrument Classes. **[8]**

b) State advantages and applications of virtual instrumentation. **[8]**

OR

Q12) a) Explain PCI express technology. **[8]**

b) How Virtual instrument is used for application such as TDM ? Explain in detail. **[8]**

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P 451   **[4064] - 121**

B.E. (E&TC)

COMPUTER NETWORKS

(2003 Course) (404214) (Sem.-I)

Time : 3 Hours]   *[Max Marks : 100*

Instructions to candidates :

1) *Answer 3 questions from section I and 3 questions from Section II.*
2) *Answers to the two sections should be written in separate books.*
3) *Neat diagrams must be drawn wherever necessary.*
4) *Figures to the right indicate full marks.*
5) *Use of logarithmic tables, slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.*
6) *Assume suitable data, if necessary.*

SECTION-I

Q1) a) Draw & Explain ISO-OSI Reference models for computer Networks. **[8]**

b) Explain Layer3 switch Versus Routers used in computer networks.**[4]**

c) Explain advantages and disadvantages of Client server Model.   **[4]**

OR

Q2) a) Draw and Explain Physical layer of 802.11 Wireless Networks in detail.   **[8]**

b) Explain in brief MAC address, IP address and port Addresses in Computer N/Ws.   **[4]**

c) Explain advantages and disadvantages peer to peer based network. **[4]**

Q3) a) Compare LEO Vs MEO Vs GEO.   **[8]**

b) What is the maximum data rate for a telephone line with BW 4.1 kHz and 35db SNR ?   **[4]**

c) Write a short note on Virtual Packet switching.   **[4]**

OR

Q4) a) Compare Circuit switching with Packet Switching. Also explain it with suitable analogy. **[8]**

b) Write a short note on ADSL with briefing the frequency spectrum used in it. **[4]**

c) What is the maximum bit rate for a Metallic Line with BW 8000Hz and 50db SNR ? **[4]**

Q5) a) Draw & Explain the HDLC frame format. **[8]**

b) Explain Go Back N ARQ protocol in detail. **[6]**

c) What is the framing concept in Data link Layer ? Explain any one in details. **[4]**

OR

Q6) a) Consider a 64 Kbps geostationary satellite channel is used to send 512 byte data frames in one direction, with a very short acknowledgement coming back the other way. What is the maximum throughput for window size of 1, 7, 15, and 127 using sliding window protocol ? **[8]**

b) Draw and Explain 802.3 Frame format in detail. **[6]**

c) Explain CSMA/CD and CSMA/CA. **[4]**

SECTION-II

Q7) a) In token bucket system calculate the required parameters in following two different cases. **[8]**

i) Computer system on a 6Mbps network is regulated by a token bucket is filled at a rate of 2 Mbps. It is initially filled to capacity 12 Mbit. How long can the computer system transmit at full rate of 6Mbps.

ii) Network processing computer on a 10 Mbps network is regulated by a token bucket.It is initially filled to capacity 18Mbit. Time taken by Network processing computer to transmit at full rate of 10 Mbps is 3 sec. At what rate the token bucket should be filled up ?

b) Explain the Distance vector routing in detail. **[4]**

c) Explain Dijkstras routing algorithms ? **[4]**

Q8) a) Compare connection oriented Vs connectionless service ? Compare TCP Vs UDP. **[8]**

b) Explain Three way handshake used by TCP. **[4]**

c) Define delay, congestion, throughput & jitter. **[4]**

Q9) a) Explain RSA algorithm in detail. **[8]**

b) What is DNS ? What are three main components of DNS ? **[4]**

c) Write a short note on HTML programming. **[4]**

OR

Q10) a) Explain Substitution and Transposition Cipher in detail **[8]**

b) Write a short note on "Proxy server as firewall". **[4]**

c) What is Video on Demand system ? **[4]**

Q11) a) Compare IPv4 Vs IPv6. **[6]**

b) Explain Remote execution with suitable example. **[6]**

c) Explain ARP and RARP in detail. **[6]**

OR

Q12) a) What are the different types of Public IP addresses ? Write Socket address for class A Web Server, FTP server, Telnet Server & SMTP server. **[6]**

b) Explain NFS & RPC briefly. **[6]**

c) Explain DHCP system briefly. **[6]**

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P 453   **[4064] - 123**
B.E. (E & TC) (2003 Course)
ELECTRONIC PRODUCT DESIGN
(404216) (Sem. - I)

Time : 3 Hours]   *[Max Marks : 100*
Instructions to candidates :

1) *Answer three questions from section I and three questions from SectionII.*
2) *Answers to the two sections should be written in separate books.*
3) *Neat diagrams must be drawn wherever necessary.*
4) *Figures to the right indicate full marks.*
5) *Assume suitable data if necessary.*
6) *Use of electronic pocket calculator is allowed.*

SECTION-I

Q1) a) Explain the concept of reliability and bath tub curve indicating all its region. Also explain how failures in early failure region and wear art region are reduced prior to shipment of electronic product.   **[8]**

   b) Draw the circuit diagram of DC regulated power Supply with power on indication using three pin regulator and bridge rectifier. Find MTTF for the circuit. Failure rates of components are given below: **[6]**

Component	Failure rate per 10^6 hours
Power transformer	0.23
Fuse	0.30
Rectifier diode	0.21
Electrolytic capacitor	0.65
Ceramic capacitor	0.42
Regulator IC	0.002
Resistor	0.04
LED	0.05

   c) What is need of decoupling capacitor in digital circuits and where it should be placed.   **[4]**

OR

Q2) a) Explain the mechanism of generation of:

   i)   Conducted EMI   ii)   Radiated EMI   **[6]**

P.T.O.

b) Draw a sketch of front panel of a laboratory function Generator and explain how orgonomic and aesthetic design cansiderations are taken care of the same. **[8]**

c) For a field case, it is desirable to achieve 40dB shielding effectiveness using conductive coating on enclosure. What should be the coating impedance in Ω /square **[4]**

Q3) Discuss the mechanism of generation and preventive methods for following phenomena in high-speed PCB designs.
a) Crosstalk
b) Reflections
c) Skin Effect
d) Ground bounce **[16]**

OR

Q4) a) For a standard 71μ m copper clad laminate, calculate inductance of 20 cm long track on PCB having width 0.6mm. **[4]**

b) For a 36 micron copper clad laminate, What will be the value of resistance of a 2 mm wide and 16 cm long track. Assume resistive of copper 1.724×10^{-6} ohm-cm. **[4]**

c) Two tracks on a 1.8 mm thick PCB laminate have a parallel run of 14 cm on opposite faces of a double sided PCB. The track thickness is 36 micron and track width is 0.5 mm. If relative dielectric canstant of PCB laminate is 4.2 and conductivity of copper 1.724×10^{-6} ohm-cm, calculate 3 dB frequency of low pass filter formed by parasitic components with given geometry. Assume that parasitic R and C are lumped. **[8]**

Q5) a) Explain the meaning of term-signal integrity. Also explain with the help of neat sketches how it is affected by limited
i) Band width ii) Sampling rate
iii) Memory depth iv) Impedance of probe. **[8]**

b) With the help of schematic arrangement explain in details the type of diagnostic instrument and its features used in detecting a short circuit on two thin tracks running adjacent to each other on PCB. One of the tracks is from data bus and other from address bus of microprocessor based system. **[8]**

OR

Q6) a) In context of digital storage oscilloscope (DSO), explain the factors that decide the choice between following modes: **[8]**

      i) Edge and level triggering.

      ii) Real and equivalent time sampling.

      iii) Normal and AUTO modes.

      iv) ch 1 and ch 2 triggering.

  b) Explain the limitations of Analog oscilloscope, DSO and logic analyzer for use in mixed signal, high-speed designs. Hence establish the need for mixed signal oscilloscope. **[8]**

SECTION-II

Q7) Write short notes on : **[18]**

  a) Modular Programming.

  b) Standard methods of debugging software

  c) In circuit emulator.

  d) steps from coding to the generation of executable code when using a combination of assembly and C Language programs.

OR

Q8) a) Explain the factors that determine the choice between developing software for a data logger system in : **[6]**

      i) Assembly language and   ii) High-level language.

  b) Explain with the help of a real-life microcontroller based product how all recommended steps in software developement are implemented.

[12]

Q9) a) Explain different temperature tests that should be carried out on an industrial process controller. Indicate different Parameters associated with these tests. **[8]**

  b) Specify with justification the choice of environmental tests to be carried out on following products: **[8]**

      i) Washing machine

      ii) Mobile Phone

      iii) UPS.

      iv) Laptop.

Q10) Explain why electronic products are required to be tested for: **[16]**

a) Conducted EMI,

b) Radiated EMI.

c) Conducted Susceptibility.

d) Radiated Susceptibility. For each of the above type of test, give a suitable practical example to explain the mechanism that upsets normal working of electronic products.

Q11) In product documentation, explain the importance and typical items/ contents of following documents/ drawings- **[16]**

a) front panel.

b) Schematic diagram.

c) Inter connection diagram.

d) Bill of materials.

e) PCB assembly.

OR

Q12) a) What do you mean by Bare Board testing. Justify need for it in large scale manufacturing. Draw a sketch of typical BBT arrangement. In what situation Bare Board testing is essential. **[8]**

b) With the help of neat diagrams explain significance of drilling details, component assembly diagram and solder mask, in context of PCB assembly. **[8]**

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P454   **[4064]-125**

B.E. (E&TC)

EMBEDDED SYSTEMS DESIGN

(Sem. - I) (2003 Course) (Elective - I) (404218)

Time : 3 Hours]   [*Max. Marks : 100*

Instructions to the candidates:

1)   *Answer three questions from section I and three questions from section II.*

2)   *Answers to the two sections should be written in separate books.*

3)   *Neat diagrams must be drawn wherever necessary.*

4)   *Figures to the right indicate full marks.*

5)   *Assume suitable data, if necessary.*

SECTION - I

Q1) a) Explain the following design metrics of an embedded system.

     i)   Power

     ii)   Performance

     iii) Size

     iv)   NRE cost   **[8]**

    b) Explain the different topologies of a Blue tooth Piconet.   **[10]**

OR

Q2) a) Compare IEEE 802.11 with IEEE 802.16.   **[5]**

    b) Explain the concept of bit encoding in CAN.   **[8]**

    c) What is time to market design metric. Explain.   **[5]**

Q3) a) What are the special units required in processors for real time video processing systems and video games. Explain.   **[8]**

    b) With an example, explain the factors to be considered while selecting a processor for an embedded system.   **[8]**

OR

Q4) a) Explain in detail hardware architecture and software flowchart for interfacing keyboard and A/D converter in an embedded system. **[8]**

b) Explain the processor selection criteria for
   i)   Digital camera
   ii) Coin Vending Machine **[8]**

Q5) a) What are the states of task? Explain. Which is the entity controlling the transitions from one state to another in a task. How do functions differ from ISRS, tasks, threads? **[8]**

b) When are sockets used for IPCS. Explain with an example. **[8]**

OR

Q6) a) How does the control of resources is transferred from one task to another? Define critical section of a task. **[8]**

b) Explain in detail different tools used for developing software. **[8]**

SECTION - II

Q7) a) Write C code for implementation of message queue for RTOS. **[10]**

b) Explain the different types of semaphore. Also explain the use of semaphore. **[8]**

OR

Q8) a) Write C code for implementing events for RTOS. **[10]**

b) Compare message queue with mail box. **[8]**

Q9) a) Compare NUCLEUS with QNX. **[8]**

b) Explain the following functions of µC/OS II

   i)   OS _ EXIT _ CRITICAL

   ii) OSM box Post ( )

   iii) OS Time Dly HMSM

   iv) OS Start ( ) **[8]**

OR

Q10) a) Explain the phases and models of software development process.   **[8]**

b) What is the operating system selection criteria for mobile computing.**[8]**

Q11) Architect Digital video Recorder, explain with detailed block diagram. Provide detailed design with suggested processor and peripherals.   **[16]**

OR

Q12) Architect smart card based vending Machine with WiFi interface, explain with detailed block diagram. Provide detailed design with suggested processor and peripherals.   **[16]**

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P 455　　　　　　　**[4064] - 126**

B.E. (E & TC)

ADVANCE POWER ELECTRONICS

(2003 Course) (404218) (Sem. - I) (Elective - I)

Time : 3 Hours]　　　　　　　　　　　　　　*[Max Marks : 100*

Instructions to candidates :

　　1)　Answer three question from section I and three questions from Section II.
　　2)　Answers to the two sections sohuld be written in separate books.
　　3)　Neat diagrams must be drawn wherever necessary.
　　4)　Figures to the right indicate full marks.
　　5)　Your answers will be valued as a whole.
　　6)　Use of logarithmic tables slide rule. Mollier charts, electronic pocket calculator and steam tables is allowed.
　　7)　Assume suitable data, if necessary.

SECTION-I

Q1) a)　What are dc drives? Explain with neat circuit diagram & waveforms, working of 1ϕ HCC, separately excited dc motor.　　**[10]**
　　　Comment on Tq & speed characteristics.

　　b)　What is regenerative braking ? Explain in brief　　**[6]**

OR

Q2) a)　With the help of neat circuit diagram & waveforms working of 1ϕ full controlled (Converter) dc series motor with highly inductive load.　　**[10]**

　　b)　What is coasting? Explain.　　**[3]**

　　c)　Explain the need of Power factor improvement in line commutated converters.　　**[3]**

Q3) a)　Explain with neat circuit diagram & waveforms working of 3ϕ half controlled converter with RL load at $\alpha = 60^0$. Draw relevant waveforms for　　**[12]**
　　　i)　Load voltage　　ii)　Current through SCR
　　　iii)　VSCR　　　　iv)　Supply unit.

　　b)　What is the effect of source inductance 'Ls'? Explain.　　**[4]**

P.T.O.

Q4) a) What are dual converters ? Explain with circuit diagram & waveforms working of 1ϕ dual converters? Deduce the equation for circulating current for inductive load. **[8]**

b) Compare circulating & non-circulating current modes. **[6]**

c) What are the condition for Reversible dc drives.? **[2]**

Q5) a) What are inverters? Explain with circuit diagram &waveforms, working of 3ϕ Voltage source inverter in 180^0 mode conduction with R-load. **[10]**

b) Explain with block diagram, speed control technique of Induction motor by using $\dfrac{V}{F}$ method plot Torque, slip power characteristics of I.M. **[8]**

OR

Q6) Write short notes <u>any three</u>. **[18]**

a) Power factor improvement techniques.

b) Static & Dynamic equaling circuits.

c) Protection circuits for DC motor.

d) 4 Q- Reversible drives. (Choppers)

e) Dual mode dual converters.

SECTION-II

Q7) a) What are brushless dc motors? Explain with circuit diagram. **[10]**

b) What is the effect of Reactive power over the operation of DC motor. Explain in brief. **[6]**

OR

Q8) a) What are Universal Motors? Explain with CKT diagram working of any one type. **[8]**

b) What is energy audit ? Explain **[4]**

c) Necessity of feed baelr diodes in inverters. **[4]**

Q9) a) What are resonant converters ? Explain with CKT diagram & waveforms working of ZCS resonant converter. **[10]**

b) Compare Linear, switched mode & resonant converters. **[6]**

OR

Q10) a) What is power quality ? Why it is required ? Explain different types of Power line disturbances. **[10]**

b) Explain methodology of energy audit ? **[6]**

Q11) a) What are stepper motors ? List drive requirements of stepper motors drive. How can the direction, speed & position of stepper motor be controlled using microprocessor. **[12]**

b) What are synchronous Motors? Explain in brief. **[6]**

OR

Q12) Write short notes on any three. **[18]**

i) Static krammer drive.

ii) UPS (ON-LINE)

iii) ZVS.

iv) Harmonic Ellimination techniques.

v) Flux Vector control of I.M.

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P 456   **[4064] - 127**

B.E. (E & T/C)

ADVANCED DIGITAL SIGNAL PROCESSING

(2003 Course) (404218) (Sem. - I) (Elective - I)

Time : 3 Hours]   *[Max Marks : 100*

Instructions to the candidates :

1) *Answer Q1 or Q2, Q3 or Q4, Q5or Q6 ,Q 7 or Q8, Q9 or Q10, Q11 orQ12.*
2) *Answers to the two sections should be written in separate books.*
3) *Neat diagrams must be drawn wherever necessary.*
4) *Figures to the right indicate full marks.*
5) *Use of electronic pocket calculator is allowed.*
6) *Assume suitable data, if necessary.*

SECTION-I

Q1) a) Explain the difference between random signals and deterministic signals. **[6]**

b) Explain the term stationary random process. **[4]**

c) How the polyphase structures can be used for sampling rate conversion? **[6]**

OR

Q2) a) Explain the concept of **[8]**

   i) Decimation by a factor D.

   ii) Interpolation by a factor I.

   iii) Sampling rate conversion by a factor I/D.

b) Design a two stage decimator for the following specifications. **[8]**
   D = 100

   Passband : $0 \le F \le 50$

   Transition band : $50 \le F \le 55$

   Input Sampling rate : 10,000 Hz

   Ripple $S_1 = 10^{-1}$ $S_2 = 10^{-3.}$

Q3) a) Explain how adaptive filters can be used in telephone echo cancellation? **[8]**

b) The estimate of the desired signal at the output of an adaptive noise Canceller is given by **[8]**

$$\hat{S}_k = Y_k - \hat{n}_k$$

$$= S_k + n_k - \hat{n}_k$$

S_k = signal, n_k = noise, $\hat{S}_k$ = signal estimate, $\hat{n}_k$ = noise estimate

Show that minimizing the total power at the output of the canceller maximizes the output signal to noise ratio.

OR

Q4) a) With the help of mathematical expression explain how mean square error is reduced using LMS algorithm. **[8]**

b) Explain RLS algorithm along with the Computation of weight matrix and limitations of RLS algorithm **[8]**

Q5) a) Explain AR, MA and ARMA process in detail. **[8]**

b) Explain how Levinson - Durbin algorithm can be used for the solution of normal equation. **[10]**

OR

Q6) a) Explain forward and backward linear prediction with the help of block diagram. **[10]**

b) What is Wiener filter ? Explain the different types of Wiener filter in detail. **[8]**

SECTION-II

Q7) a) What is non parametric method of power spectrum estimation? Explain the Welch method of power spectrum estimation. **[10]**

b) The Bartlett method is used to estimate the power spectrum of a signal x(n) consisting of 2400 samples. **[8]**

i) Determine the smallest record length of each segment that yields the frequency resolution of $\Delta f = 0.01$.

ii) Determine the quality factor Q_B.

OR

Q8) a) Explain how the estimation of the autocorrelation and power spectrum of random signal can be obtained using Periodogram. **[8]**

b) Show that autocorrelation function and energy spectral density (ESD) form a fourier transform pair. **[10]**

Q9) a) With neat block diagram explain Harvard architecture and also show using timing diagram how instruction overlap is made possible. **[10]**

b) In a nonpipelined machine the instruction fetch, decode and execute takes 35ns, 25ns and 40ns respectively. Determine the increase in throughput if the instruction steps were pipelined .Assume a 5ns pipeline overhead at each stage and ignore other delays. **[6]**

OR

Q10) a) Draw the block diagram of SHARC processor and explain its architecture. **[8]**

b) Write an algorithm to realize a FIR digital filter using DSP processor. **[8]**

Q11) a) Draw the block diagram of digital model of Speech production and explain its operation. **[8]**

b) What is short time Fourier transform ? Explain the speech analysis - synthesis system based on short time spectrum analysis. **[8]**

OR

Q12) a) Explain the operation of channel vocoder with the help of neat block diagram. **[8]**

b) Explain what do you mean by homomorphic processing of speech. With the help of block diagram. **[8]**

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Total No. of Questions : 12]   [Total No. of Pages : 4

P460   **[4064]-132**

B.E. (E & T C)

OPTICAL AND MICROWAVE COMMUNICATIONS
(2003 Course) (404224) (Sem. - II)

Time : 3 Hours]   [*Max. Marks : 100*

Instructions to the candidates:

1) *Attempt Q. 1 or Q. 2, Q. 3 or Q. 4, Q. 5 or Q. 6 from Section - I and Q. 7 or Q. 8, Q. 9 or Q. 10, Q. 11 or Q. 12 from Section - II.*
2) *Answers to the two sections should be written in separate answer books.*
3) *Neat diagrams must be drawn wherever necessary.*
4) *Figures to the right indicate full marks.*
5) *Assume suitable data, if necessary.*
6) *Use of electronic calculator is allowed.*

SECTION - I

Q1) a) Explain in brief advantages and disadvantages of optical fiber cable over coaxial cables. **[6]**

b) When photons of energy 1.5×10^{-19} J are incident on a photodiode, its quantum efficiency is found to be 70%. Findout the wavelength of operation, incident optical Power and responsivity when the photocurrent in the diode is 4 μA. **[6]**

c) What is LASER? Mention population inversion condition. Compare LASER & LED. **[6]**

OR

Q2) a) With the help of neat diagram explain construction and working of Avalanche Photodiode. **[6]**

b) For a 3μm diameter optical fiber with core and cladding indexes of refraction of 1.545 and 1.510 respectively. Determine the cut off wavelength. **[6]**

c) Compare singlemode & multimode fiber in detail. **[6]**

P.T.O.

Q3) a) What is OTDR? Draw block schematic & explain its working. **[6]**

b) When the optical power launched into a 10 km length fiber is 100 μW, the optical power at fiber output is 5 μW. Calculate **[6]**

i) Overall signal attenuation in dB

ii) Signal attenuation per km

iii) The overall signal attenuation for a 12 km optical link using same fiber with splices at 1 km interval, each giving attenuation of 0.5dB.

c) Explain the two main causes of intramodal or chromatic dispersion. **[4]**

OR

Q4) a) List three main causes of attenuation in an optical fiber and explain their mechanisms. **[6]**

b) For a 30 km long fiber attenuation 0.8 dB/km at 1300 nm. If a 200 μW Power is launched into the fiber, find the output Power. **[4]**

c) Explain material dispersion in brief with suitable sketch. **[6]**

Q5) a) What are the two analysis usually carried out to ensure the desired performance of optical fiber transmission link? Explain any one of them in detail. **[8]**

b) Explain the basic structure of an STS - N SONET frame. Also explain how it is different from STS -1. **[8]**

OR

Q6) a) What are the three classes of optical amplifiers and explain their applications. **[8]**

b) An optical fiber system is to be designed to operate on 8 km length without repeaters. The rise times of chosen components are source (LED) : 8 nS Fiber cable: Intermodal : 5 ns/km

Intramodal : 1 ns/km

Detector (PIN) : 6 ns

Estimate maximum bit rate that may be achieved on the link when using NRZ & RZ formats. **[8]**

SECTION - II

Q7) a) An air filled rectangular waveguide has dimensions of a = 6 cm and b = 4 cm. The signal frequency is 3 6Hz. Compute the following for TE_{10} mode.

   i) Cut off freq

   ii) Wavelength in a waveguide

   iii) Wave impedance in a waveguide. **[6]**

b) The Propagation constant γ_g in a waveguide differs from the intrinsic propagation constant γ of the dielectric. Explain the three cases for the propagation constant γ_g in a waveguide. **[6]**

c) For a two port network if the frequencies are in microwave range why h, y & z parameters can not be measured. **[4]**

OR

Q8) a) With the help of suitable diagram explain the operation of two hole directional coupler. **[6]**

b) Explain working of isolator and give its applications. **[6]**

c) Write down an s matrix of a magic tec. **[4]**

Q9) a) A reflex klystron operates under the following conditions V_o = 500 V, R_{sh} = 20 k Ω, f_r = 86 Hz, L = 1 mm is the spacing bet^n repeller & cavity.

   The tube is oscillating at fr at the peak on n = 2 mode or $1\frac{3}{4}$ mode. Assume that the transit time through the gap and beam loading effect can be neglected.

   i) Find the value of repeller voltage V_R

   ii) Find the dc necessary to give microwave gap of voltage of 200 V.

   iii) Calculate electronic efficiency. **[10]**

b) Explain the working of HTWT with the help of suitable diagram. **[8]**

OR

Q10) a) What is slow wave structure? What are their types? Which one is most practical. **[4]**

b) A normal circular magnetron has the following parameters.
Inner radius R_a = 0.15 m
Outer radius R_o = 0.45 m
Magnetic flux density β_o = 1.2 mWb/m²

   i) Determine the Hall cut off voltage

   ii) Determine the cutoff magnetic flux density if the beam voltage V_o as 6000V.

   iii) Determine the cyclotron frequency in GHz. **[10]**

c) Explain how mode jumping is avoided in magnetron. **[4]**

Q11) a) Explain principle of operation, IV characteristics and equivalent circuit of microwave tunnel diode. **[8]**

b) Write short notes on following:
   i) Microwave transistor
   ii) Stripline **[8]**

OR

Q12) a) Explain various modes of operation of Gunn diode. Explain LSA mode and give limitations of this mode. **[8]**

b) Draw constructional details and equivalent circuit of varactor diode. Explain its operation with any four applications. **[8]**

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P 462   **[4064]-136**

B.E. (E/TC)

AUDIO & VIDEO ENGINEERING

(2003 Course) (404225) (Sem. - II) (Elective - II)

Time : 3 Hours]   *[Max Marks : 100*

Instructions to the candidates :

1) *Answers any three questions from each section.*

2) *Answers to the two sections should be written in separate answer books.*

3) *Neat diagrams must be drawn wherever necessary.*

4) *Figures to the right indicate full marks.*

5) *Use of electronic pocket calculator is allowed.*

6) *Assume suitable data if necessary.*

SECTION I

Q1) a) Draw a neat sketch of composite video signal indicating all numerical values for different timing for various pulses used in CCIR-B standard. What is the necessity of these pulses ?   **[6]**

b) State the various specifications of CCD camera.   **[6]**

c) Compare the technologies suitable for flat panel displays.   **[6]**

OR

Q2) a) State the specifications of CCIR-B standard for television.   **[8]**

b) Explain the construction of a CCD imager. What are the different methods of charge transfer ?   **[6]**

c) Calculate the highest bandwidth for CCIR TV system with 625 lines, kell factor = 0.72 & aspect ratio= 4:3.   **[4]**

Q3) a) Discuss the main characteristics of human eye with respect to perception of color. What is the difference between additive & subtractive mixing of colors ?   **[8]**

b) With the help of neat block diagram explain the operation of color TV receiver.   **[8]**

OR

Q4) a) Explain with the help of block schematic the facilities provided in a Wobbuloscope & explain its use in alignment of RF tuner, video IF amplifier & sound IF amplifier. **[8]**

b) Draw neat block diagram of PAL-D decoder & explain function of each block. **[8]**

Q5) a) What is the need of MAC encoding & explain the general format MAC signal for transmitting color TV signals ? **[8]**

b) Explain with neat block diagram JPEG encoder & decoder. **[8]**

OR

Q6) a) Compare the analog TV with DTV & HDTV. **[8]**

b) What are the objectives of MPEG-2 standard? What do you understand by the term bit stream scalability? How does layered coding approach improve the quality of picture while offering flexibility? **[8]**

SECTION II

Q7) a) Draw a neat block diagram of HDTV decoder and explain function of each block. **[8]**

b) Explain the direct-to-home (DTH) technique for TV broadcasting using neat block diagram. **[6]**

c) State the different advantages of HDTV. **[4]**

OR

Q8) a) With suitable block diagram explain CCTV system. State the applications of CCTV. **[6]**

b) Using schematic diagram of equipment set up explain the TV coverage plan for a cricket match. **[8]**

c) Explain the concept of video on demand. **[4]**

Q9) a) Draw the basic block diagram of CD Player & describe function of each block. **[8]**

b) What is the relationship between gap size, tape speed & frequency of audio signal in case of magnetic recording on tape? Explain the importance of relationship to get optimum o/p for audio bandwidth. **[8]**

OR

Q10) a) Discuss the different methods of sound recording on photographic films. **[8]**

b) Explain MPEG audio compression formats. **[8]**

Q11) a) Define the following terms - **[8]**

    i) Reverberation

    ii) Absorption coefficient

    iii) Accoustics chamber

    iv) sound reduction index (SRI).

b) Explain with neat block diagram how digital satellite radio (DSR) receiver works ? **[8]**

OR

Q12) a) Explain the working of a typical chordless microphone PA system. State the type of microphone used & their specifications. **[8]**

b) Write short notes on - **[8]**

    i) Speakers for cell phones.

    ii) Hi - Fi system.

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P463   **[4064]-143**

B.E. (Instrumentation & Control)
DIGITAL CONTROL
(2003 Course) (Sem. - I) (406263)

Time : 3 Hours]   *[Max. Marks : 100*

Instructions to the candidates:
1) *Answer any three questions from each section.*
2) *Answers to the two sections should be written in separate books.*
3) *Neat diagrams must be drawn wherever necessary.*
4) *Use of logarithmic tables, sliderule, Mollier charts, electronic pocket calculator and steam tables is allowed.*
5) *Assume suitable data, if necessary.*

SECTION - I

Q1) a) Derive a mathematical model of ZOH. Derive the pulse transfer function of the closed loop control system shown by Fig. 1 **[8]**
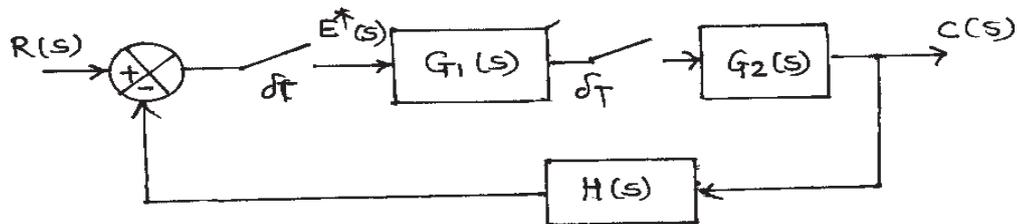

Fig. 1

b) Consider the discrete time unity feedback control system with sampling period $T=1$, whose open loop transfer function is given by

$$G(z) = \frac{K(0.1595z + 0.3642)}{(z - 0.1595)(z - 1)}$$

Determine the range of gain K for stability by using Jury stability test. **[8]**

OR

Q2) a) Obtain the pulse transfer function of the system shown in Fig.2 **[6]**

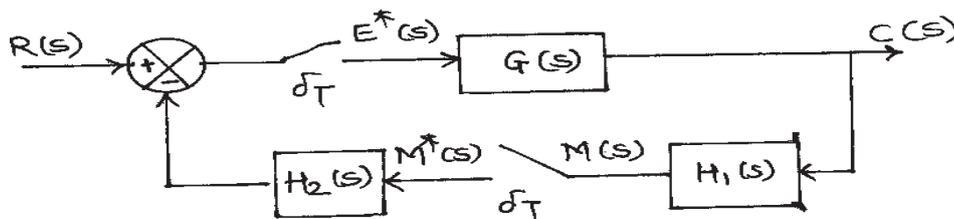
Fig. 2

b) For a unity feedback closed loop system (Fig.3) to be stable, find the range of $K>0$ (static gain constant) when $T=1$ sec, $T=2$ sec and $T=4$ sec Comment on the effect of sampling on stability and static gain constant. **[10]**
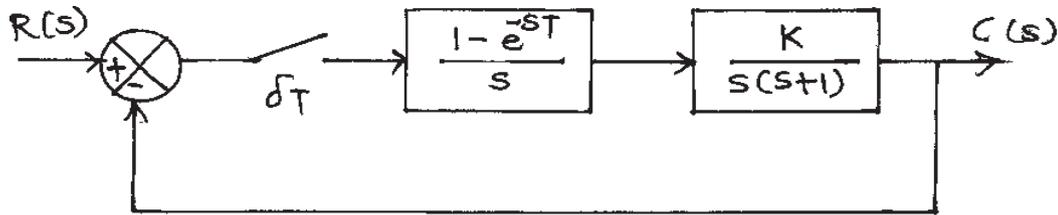
$$\text{Fig. 3}$$

Q3) a) Obtain the state transition matrix of the following discrete time system

$$\begin{bmatrix} x_1(k+1) \\ x_2(k+1) \end{bmatrix} = \begin{bmatrix} 0 & -1 \\ -0.75 & -1 \end{bmatrix}\begin{bmatrix} x_1(k) \\ x_2(k) \end{bmatrix} + \begin{bmatrix} 1 \\ 1 \end{bmatrix} u(k) \text{ and } y(k) = \begin{bmatrix} 1 & 0 \end{bmatrix}\begin{bmatrix} x_1 & (k) \\ x_2 & (k) \end{bmatrix}$$ **[10]**

b) Diagonalize the following matrix

$$G = \begin{bmatrix} 0 & 1 & 0 \\ 0 & 0 & 1 \\ -8 & -17 & -10 \end{bmatrix}$$ **[6]**

OR

Q4) a) Derive an expression for the pulse transfer function of discrete time system.**[8]**

b) Determine the stability of the equilibrium state of the following system

$$\begin{bmatrix} x_1(k+1) \\ x_2(k+1) \end{bmatrix} = \begin{bmatrix} 0 & 1 \\ -0.5 & 1 \end{bmatrix}\begin{bmatrix} x_1(k) \\ x_2(k) \end{bmatrix}.$$ Also find the Liapunov function. **[8]**

Q5) a) Derive an expression for velocity form of PID controller algorithm. State advantages of velocity form over position form of PID algorithm. **[10]**

b) Consider the digital control system with $G_p(s) = \dfrac{1}{s(s+1)}$. Design a deadbeat controller $G_D(z)$ such that the closed loop system will exhibit a deadbeat response to a unit step input. **[8]**

OR

Q6) a) Explain the concept of design of digital controller for minimum settling time with zero steady state error (Deadbeat controller). State the characteristics of Deadbeat controller. **[10]**

b) Explain the concept of ringing of poles. Consider a transfer function of

digital controller $D(z) = \dfrac{K\left(1 - 0.7z^{-1}\right)}{\left(1 + 0.8z^{-1}\right)\left(1 - z^{-1}\right)\left(1 - 0.6z^{-1}\right)}$

Obtain the modified transfer function of the controller by minimizing the ringing effect. **[8]**

SECTION - II

Q7) a) Derive an expression for Ackermann's formula for pole placement. **[8]**

b) Consider the system $x(k + 1) = Gx(k) + Hu(k)$ and $y(k) = Cx(k)$ where

$G = \begin{bmatrix} -1 & -2 & -2 \\ 0 & -1 & 1 \\ 1 & 0 & 1 \end{bmatrix}, H = \begin{bmatrix} 2 \\ 0 \\ 1 \end{bmatrix}$ and $C = \begin{bmatrix} 1 & 1 & 0 \end{bmatrix}$.

Check the system for complete state controllability. **[8]**

OR

Q8) a) Consider the system $x(k+1) = Gx(k) + Hu(k)$ and $y(k) = Cx(k)$ where

$G = \begin{bmatrix} 0 & -0.16 \\ 1 & -1 \end{bmatrix}, H = \begin{bmatrix} 0 \\ 1 \end{bmatrix}$ and $C = \begin{bmatrix} 0 & 1 \end{bmatrix}$

Design a full order observer, if the desired eigen values of the observer matrix are $z = 0.2 \pm j0.2$. **[8]**

b) State and derive the expressions for state controllability and state observability. **[8]**

Q9) a) Explain the effect of dead time on the performance of system. Explain the Smith predictor for compensation of dead time. Also state the important features of deadtime compensator. **[12]**

b) Write a short note on 'Self tuning Regulator'. **[4]**

OR

Q10) Explain the internal model control (IMC) strategies. Design IMC for the system with transfer function

$$\tilde{G}_p(s) = \frac{2e^{-5s}}{1+20s}.$$ Also convert it into conventional controller with

approximate dead time as $e^{-Ds} = \dfrac{1 - \dfrac{Ds}{2}}{1 + \dfrac{Ds}{2}}$ **[16]**

Q11) State the Quadratic Optimal Control problem. Consider the discrete time control system defined by **[18]**

$$\begin{bmatrix} x_1(k+1) \\ x_2(k+1) \end{bmatrix} = \begin{bmatrix} 1 & 1 \\ a & -1 \end{bmatrix} \begin{bmatrix} x_1(k) \\ x_2(k) \end{bmatrix} and \begin{bmatrix} x_1(0) \\ x_2(0) \end{bmatrix} = \begin{bmatrix} 1 \\ 0 \end{bmatrix}$$

Where $-0.2 \le a < 0$. Determine the optimum value of a that will minimize the following performance index

$$J = \frac{1}{2} \sum_{k=0}^{\infty} x^*(k)Qx(k).$$

OR

Q12) Write short notes on following system identification methods (any three):**[18]**

   a) ARX model

   b) ARMA model

   c) Least Square Estimation

   d) Output error method.

■■■

P465   **[4064]-147**

B.E. (Instrumentation and Control)

ADVANCED CONTROL SYSTEMS

(Sem. - I) (2003 Course) (Elective - I) (406264)

Time : 3 Hours]   [*Max. Marks : 100*

Instructions to the candidates:

    1)   *Answer three questions from Section I and three questions from Section II.*

    2)   *Answers to the two sections should be written in separate books.*

    3)   *Neat diagrams must be drawn wherever necessary.*

    4)   *Figures to the right indicate full marks.*

    5)   *Assume suitable data, if necessary.*

SECTION - I

Q1) a) Compare the characteristics of Linear and Nonlinear systems.   **[6]**

    b) Find the frequency and Amplitade of Limit Cycle (s) for the system as shown in figure1.   **[12]**
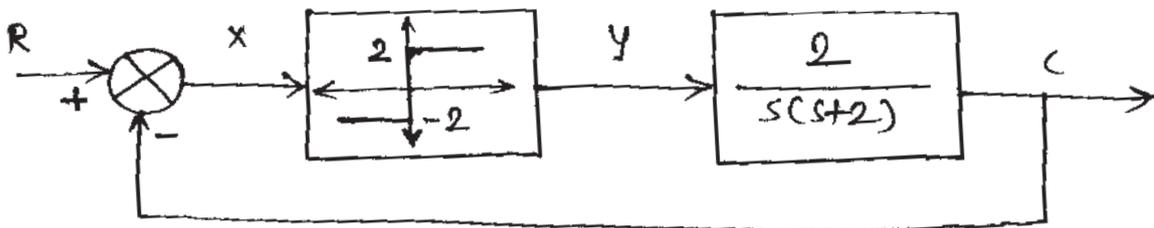
Fig. 1

OR

Q2) a) Find the describing function for the Nonlinear system having characteristics as shown in figure 2.   **[12]**

Fig. 2

P.T.O.
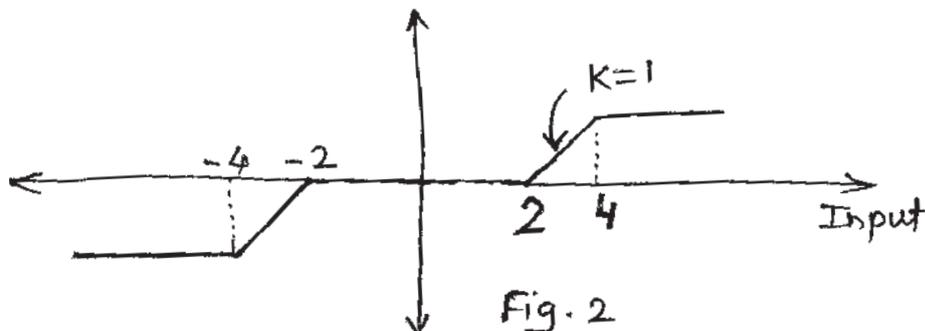
b) Explain the concept of Jump resonance with the help of soft and Hard spring. **[6]**

Q3) Consider a system as shown in figure 3. Find the amplitude and frequency of limit cycles. Also comment on nature of limit cycle (s) and stability of system. **[16]**
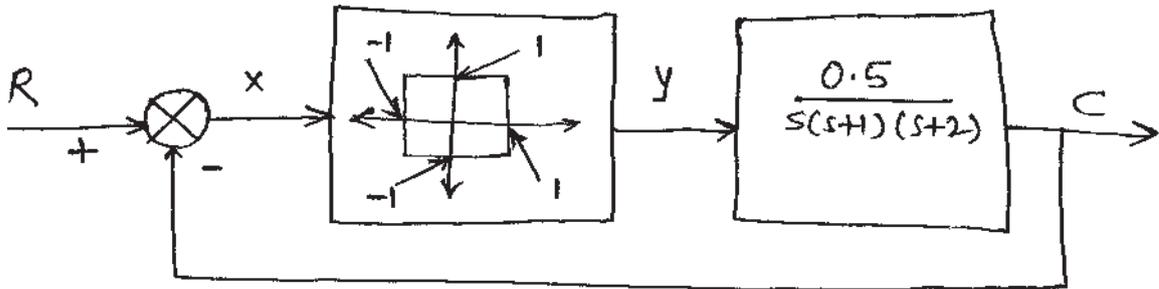
fig. 3

OR

Q4) An amplifier as shown in figure 4. Drives a Two phase servomotor. The transfer function of the motor is $G(s) = \dfrac{k.e^{-0.1s}}{S(0.15+1)}$

Investigate the stability of the system for $k = 0.1$. What is the largest value of k for no limit cycle to exist? **[16]**
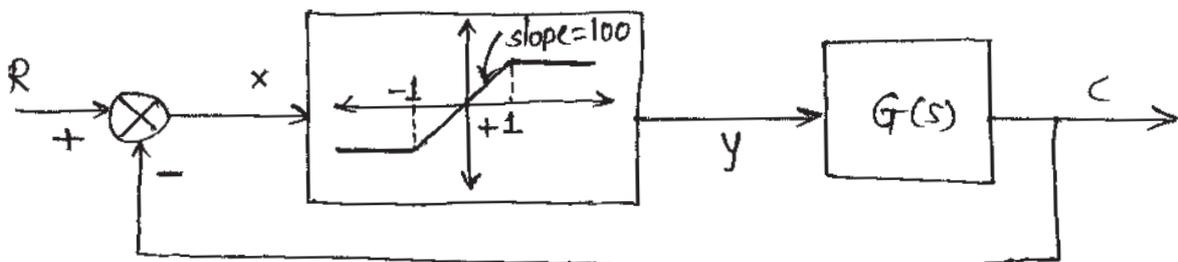
fig. 4

Q5) a) Explain MIT Rule for continous time model reference adaptive control scheme with reference to first order system. **[8]**

b) Explain different elements of model reference adaptive control (MRAC) system with neat block diagram. **[8]**

OR

Q6) a) Explain model Reference adaptive control using lyapunov approach for stability analysis of continous time system. **[6]**

b) Consider the dynamics of mass-spring-damper system given by

$$M\frac{d^2y}{dt^2}+\beta\frac{dy}{dt}+ky=u$$

Where M = B = k = 2, y = output, u = input.

Design model reference adaptive control (MRAC) system to follow the

response of reference model given by. $\frac{d^2ym}{dt^2}+15.14\frac{dym}{dt}+ym=\gamma$

Select $\gamma=1$ **[10]**

SECTION - II

Q7) a) Derive least square (LS) as a real time parameter estimator. **[8]**

b) In self- Tuning regulator (STR) following input output data has been obtained form real plant.

Time (t)	Input data [u(t)]	Out put data [y(t)]
1	1.0	0.0
2	0.5	0.5
3	1.0	–0.5
4	1.0	1.25
5	0.0	0.35

[10]

OR

Q8) Write short note on **[18]**

a) Indirect self-tuning regulators

b) Continous time self tuners

c) Direct self tuning regulators.

Q9) a) Obtain the control law that minimizes the performance index.

$$J = \int_0^\infty \left(x_1^2 + u^2 \right) dt \text{ for the system.}$$

$$\begin{bmatrix} \dfrac{dx_1}{dt} \\ \dfrac{dx_2}{dt} \end{bmatrix} = \begin{bmatrix} 0 & 1 \\ 0 & 1 \end{bmatrix} \begin{bmatrix} x_1 \\ x_2 \end{bmatrix} + \begin{bmatrix} 0 \\ 1 \end{bmatrix} u$$

using reduced matrix Riccati equation **[8]**

b) Consider the feedback system shown in figure 5. The output required to track unit step. Find the value of α (alpha) that minimizes integral square error. **[8]**
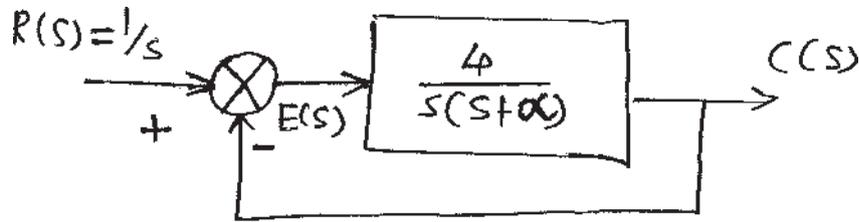
Fig. 5

OR

Q10) Consider the plant.

$$\begin{bmatrix} \dfrac{dx_1}{dt} \\ \dfrac{dx_2}{dt} \end{bmatrix} = \begin{bmatrix} 1 & 0 \\ -1 & 2 \end{bmatrix} \begin{bmatrix} x_1 \\ x_2 \end{bmatrix} + \begin{bmatrix} 1 \\ 0 \end{bmatrix} u$$

a) Prove that the system is unstable.

b) Prove that the system is controllable.

c) Select the values for matrices Q and R with the constraint that they are positive definite and desing a controller for the plant so as to minimize

$$J = \frac{1}{2} \int_0^\infty \left(x^T Q x + u^T R u \right) dt$$

check that the resulting overall system is stable. **[16]**

Q11) a) Explain the temperature control of a distillation column using adaptive control technique. **[8]**

b) Enlist the considerations in design of Robust control system. **[8]**

OR

Q12) a) Obtain the control law that minimizes the performance index. $J = {}_0\int^\infty \left(x_1^2 + u^2 \right)$ dt for the system. **[8]**

$$\begin{bmatrix} \dot{x}_1 \\ \dot{x}_2 \end{bmatrix} = \begin{bmatrix} 0 & 1 \\ 0 & 0 \end{bmatrix} \begin{bmatrix} X_1 \\ X_2 \end{bmatrix} + \begin{bmatrix} 0 \\ 1 \end{bmatrix} u$$

using reduced matrix Riccati equation.

b) State equations are

$$\begin{bmatrix} \dot{x}_1 \\ \dot{x}_2 \end{bmatrix} = \begin{bmatrix} -2 & -4 \\ 1 & -4 \end{bmatrix} \begin{bmatrix} x_1 \\ x_2 \end{bmatrix} + \begin{bmatrix} 0 \\ 2 \end{bmatrix} (u)$$

$$y = \begin{bmatrix} 1 & 0 \end{bmatrix} \begin{bmatrix} x_1 \\ x_2 \end{bmatrix}$$

determined feedback gain matrix for system & desired pole locations at –50, –50. **[8]**

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P620   **[4064]-150**

B.E. (Instrumentation & Control)
COMPUTER TECHNIQUES AND APPLICATIONS
(2003 Course) (402268) (Sem. - II)

Time : 3 Hours]   [*Max. Marks : 100*

Instructions to the candidates:

1) *Answer any three questions from each section.*
2) *Answers to the two sections should be written in separate books.*
3) *Neat diagrams must be drawn wherever necessary.*
4) *Figures to the right indicate full marks.*
5) *Use of logarithmic tables slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.*
6) *Assume suitable data, if necessary.*

SECTION - I

Q1) a) Explain the methods of Deadlock Prevention.   **[8]**

   b) With a neat diagram. explain the Process Control Block and its various fields.   **[8]**

OR

Q2) a) Explain the four conditions necessary for occurrence of deadlocks. **[8]**

   b) List and explain any four CPU scheduling algorithms.   **[8]**

Q3) a) What is external and internal fragmentation? How does paging help in minimizing fragmentation?   **[8]**

   b) What is virtual memory? With the help of neat diagram explain the implementation of virtual memory through Demand Paging.   **[8]**

OR

Q4) a) What is address binding? Explain the three stages when address binding of instructions and data to memory addresses can take place.   **[8]**

   b) With neat diagram explain Overlays.   **[8]**

Q5) Write short notes (any three) **[18]**

    a) Vector Computers

    b) Intertask dependencies

    c) Lossy and Lossless compression

    d) Types of real Time operating systems with examples

SECTION - II

Q6) a) Compare Circuit Switching and Packet Switching Networks. **[8]**

    b) Explain the Transmission Control Protocol/Internet Protocol and explain the tasks carried out at different layers. **[8]**

<div align="center">OR</div>

Q7) Write short notes : **[16]**

    i) LAN Topologies

    ii) Industrial Ethernet

Q8) a) Discuss any four levels of CMM. **[8]**

    b) What are exceptions in processors? List the seven exception types along with their interrupt vector addresses of ARM processors. **[8]**

<div align="center">OR</div>

Q9) a) List and explain the basic operating modes of ARM processors. **[8]**

    b) Discuss the technical details of IEEE 1394 **[8]**

Q10) Write short notes : (any three) **[18]**

    a) CASE tools

    b) Software Development Life cycle

    c) Integration testing

    d) White box and black box testing

<div align="center">■■■</div>

P621   **[4064]-151**

B.E. (Instrumentation & Control)
INDUSTRIAL AUTOMATION
(1997 - 2003 Course) (404269) (Sem. - II)

Time : 3 Hours]   *[Max. Marks : 100*

Instructions to the candidates:

1) Answer three questions from Section I and three questions from Section II.

2 Answers to the two sections should be written in separate books.

3) Neat diagrams must be drawn wherever necessary.

4) Figures to the right indicate full marks.

5) Use of logarithmic tables slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.

6) Assume suitable data, if necessary.

SECTION - I

Q1) a) With the help of block diagram explain the different stages involved in the development of Automation Projects.   **[8]**

b) Explain hybrid DCS with reference to automation pyramid.   **[8]**

OR

Q2) a) Compare the PLC and PAC system on the basis of its Performance criteria.**[8]**

b) Explain the role PLC and PAC system with reference to automation pyramid.   **[8]**

Q3) a) With Reference to following points differentiate between Modbus (ASCII) and Modbus (RTU) transmission modes :

i)	Characters	ii)	Error check
iii)	Frame Start	iv)	Frame end
v)	Gaps in Message	vi)	Start bit
vii)	Stop Bit	viii)	Parity	**[8]**

b) With an example explain query response cycle in Modbus.   **[8]**

OR

Q4) a) With an example explain different Action Qualifiers in SFC.   **[8]**

b) Explain the difference between Master-Slave and Server-Client Communication.   **[8]**

P.T.O.

Q5) a) What is Multidrop connection? Explain the benefits of the same. **[8]**

b) Explain four basic function blocks in FF. **[10]**

OR

Q6) a) With an example explain the Foundation Fieldbus model. **[10]**

b) Write a short note on Device-net Protocol. **[8]**

SECTION - II

Q7) a) Write a program using FBD programming method for any cascade control loop. Write the different steps involved in the configuration of function blocks. **[10]**

b) List and explain the I/O function blocks in the DCS system. **[8]**

OR

Q8) a) Write a program using FBD programming method for any cascade control loop. Write the different steps involved in the configuration of function blocks. **[10]**

b) List and explain the Logical function blocks in the DCS system. **[8]**

Q9) a) With the help of an example explain what is Third party interface? **[8]**

b) What is alarm? Explain the how the alarms are classified and prioritized. **[8]**

OR

Q10) a) Explain the user access management system in any DCS system. **[8]**

b) Explain the four level display hierarchy. **[8]**

Q11) With the help of block diagram explain what are the different stages involved in developing the automation for batch process. **[16]**

OR

Q12) What is meant by safety system architecture?
What are the different safety architectures?
Which are commonly used, in industrial applications? **[16]**

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P 622   **[4064] - 152**

B.E. (Instrumentation and Control)
ADVANCED BIOMEDICAL INSTRUMENTATION
(1997 Course & 2003 Course) (Sem. - II) (Elective - II) (406270)

Time : 3 Hours]   *[Max Marks : 100*

Instructions to candidates :

1) *Answer 3 questions from Section I and 3 questions from section II.*
2) *Answers to the two sections should be written in separate books.*
3) *Neat Diagrams must be drawn wherever necessary.*
4) *Assume suitable data if necessary.*

SECTION-I

Q1) a) With the help of neat diagram, explain the working of R wave inhibited pacemaker. **[8]**

b) Mention the advantages and disadvantages of the same. **[4]**

c) Write down the specifications of a typical pacemaker. **[4]**

OR

Q2) a) It is required to set up an ICU for 10 beds. Elaborate the implementation plans. **[10]**

b) What are different electrode configuration used in cutting and coagulation mode in ESU. **[6]**

Q3) a) With the help of graph, explain the basic working principle of a pulse oximeter. **[8]**

b) What is Electrophoresis? **[4]**

c) State and explain different methods of modulation used in telemetery. **[6]**

OR

Q4) a) Explain coulter counter used for blood cell counting. **[10]**

b) List and explain various methods for glucose measurement. **[8]**

Q5) a) Explain the construction of X-ray tube with the help of neat diagram. **[8]**

b) Draw the diagram of image intensifier and explain how it helps to improve the image qualify in fluoroscopy. **[8]**

OR

Q6) a) Discuss X-ray properties and X-ray film used for imaging. **[8]**

b) List specifications of X-ray machine and explain their importance. **[8]**

SECTION-II

Q7) a) Explain the instrumentation in thermography with the help of suitable diagram. **[8]**

b) Draw the diagram of ultrasound scanner and explain its working. **[8]**

OR

Q8) a) What is Nuclear medicine? Describe various types of detectors that are used to detect β and γ rays. **[8]**

b) Describe various types of gantries used in CT scanner. **[8]**

Q9) a) Why to use various method of imaging and list them. **[8]**

b) What is an Endoscope? Explain its construction with the help of neat diagram. **[8]**

OR

Q10) a) Explain the thermal effect of laser on body tissue and elaborate its application using this effect. **[8]**

b) List any four points of comparison for Hemodialysis and Peritoneal dialysis techniques. **[8]**

Q11) a) Describe various Orthotic and Prosthetic devices. **[8]**

b) Explain different types of wheelchair and joysticks. Specify their materials and properties. **[10]**

OR

Q12) a) Explain air bubble detection and blood leak detection systems in Hemodialysis. **[8]**

b) Describe with the help of neat diagram the principle of ultrasound lithotripsy. **[10]**

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P 466　　　　　　　　　**[4064] - 153**

B.E. (Instrumentation & Control)
POWER PLANT INSTRUMENTATION
(1997 & 2003 Course) (Sem. - II) (Elective - II) (406270)

Time : 3 Hours]　　　　　　　　　　　　　　　　*[Max Marks : 100*

Instructions to candidates :

1) Answers to the two sections should be written in separate books.

2) Neat Diagrams must be drawn wherever necessary.

3) Figures to the right indicate full marks.

4) Assume suitable data if necessary.

5) All questions are compulsory.

SECTION-I

Q1) a) Discuss in detail advantages and disadvantages of Hydro electric power plant over any other Method of power generation. **[8]**

b) How are the liquid fuels stored & utilized in power plants? **[8]**

OR

Q2) a) What are the factors affecting the site selection for Thermal Power Plant? **[8]**

b) Explain the Terms. **[8]**

　　i) Nuclear Fuel Preparation.

　　ii) Moderator & Coolant.

Q3) a) Provide a sketch and describe the operation of the Rankine steam cycle. What is the advantage of superheating the steam? **[9]**

b) Explain in brief Swelling & Shrinking effects in Boiler. What is a remedial measure for swelling & Shrinking in Boiler Drum Level Control. **[9]**

OR

Q4) a) Why feed water treatment is essential? How the water treatment methods are classified? Describe dematerializing with neat sketch. **[10]**

P.T.O.

b) Describe with the help of Suitable sketch the operation of a continuous combustion, Constant Pressure gas turbine. **[8]**

Q5) a) Why the Vibrations measurement is essential in turbine? How it is measured & Controlled? **[8]**

b) Explain the need & Principal of Following measurements in Power plant. **[8]**

    i) Steam Pressure
    ii) Smoke Density Measurement
    iii) Radiation Detection

OR

Q6) a) What are some of the common causes of turbine vibration? How is turbine performance affected over time? Where do the major losses occur, and how can they be corrected? **[8]**

b) Why is superheated steam used in turbine operation? What are the disadvantages of using wet steam in a turbine? **[8]**

SECTION-II

Q7) a) What are the functions of surge tank? Describe with neat sketch the behavior of various types of surge tanks. **[8]**

b) What is a Nuclear Reactor? Describe various parts of Nuclear Reactor. **[8]**

OR

Q8) a) How the waste is disposed off in a Nuclear Power Plant? What are the main difficulties in handling the radioactive waste? **[6]**

b) How are the water turbines governed? Describe governing system for impulse & Reaction Turbine. **[10]**

Q9) a) Explain in Brief the basic architecture of DCS system used for power plant. **[9]**

b) What is thermal pollution? Explain its effects in detail. **[9]**

OR

Q10) a) Write notes on **[10]**

      i) Fabric Filters & Baghouses

      ii) Radiation Standard

    b) What is the need of desulfurization? What are the different processes involved in desulfurization? **[8]**

Q11) a) What are the advantages of Combined Cycle Power Plant? **[8]**

    b) What is a Solar Collector? How many solar collectors are in use? **[5]**

    c) Write main applications of Solar Energy. **[3]**

<div align="center">OR</div>

Q12) a) Write short notes on **[10]**

      i) Thermoelectric Generator

      ii) Thermionic Converter

    b) How the power can be obtained from tides? What are the limitations of Tidal Power Plant? **[6]**

<div align="center">⌘⌘⌘</div>

Total No. of Questions : 12]　　　　　　　　　　[Total No. of Pages :3

P 623　　　　　　　　[4064] - 154

B.E. (Instrumentation and Control)
FIBER OPTIC INSTRUMENTATION
(Sem. - II) (2003 Course) (Elective - II)

Time : 3 Hours]　　　　　　　　　　　　　　　　*[Max Marks : 100*

Instructions to candidates :

　1)　Answer 3 questions from section I and 3 questions from section II.

　2)　Answers to the two sections should be written in separate books.

　3)　Neat Diagrams must be drawn wherever necessary.

　4)　Figures to the right indicate full marks.

　5)　Use of logarithmic tables slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.

　6)　Assume suitable data, if necessary.

SECTION-I

Q1) a)　Explain what is meant by a graded index optical fiber, giving an expression for the possible refractive index profile? Using simple ray theory concepts, discuss the transmission of light through the fiber. Indicate the major advantage of this type of fiber with regard to multimode propagation.　**[10]**

　　b)　Briefly indicate with the aid of suitable diagrams the difference between meridional and skew ray paths in step index fibers.　**[6]**

OR

Q2) a)　An optical fiber has a numerical aperture of 0.50 and a cladding refractive index of 1.59. Determine:　**[8]**

　　　i)　The acceptance angle for the fiber in water which has a refractive index of 1.33;

　　　ii)　The critical angle at the core-cladding interface.

　　b)　Describe with the aid of simple ray diagram:　**[8]**

　　　i)　Multimode step index fiber.

　　　ii)　Single-mode step index fiber.

　　　Compare the advantages and disadvantages of these two types of fiber for use as an optical channel.

P.T.O.

Q3) a) Discuss absorption losses in optical fibers, comparing and contrasting the intrinsic and extrinsic absorption mechanisms. **[9]**

b) Briefly describe linear scattering losses in optical fibers with regard to: **[8]**

i) Rayleigh scattering.

ii) Mie scattering.

OR

Q4) a) Compare stimulated Brillouin and stimulated Raman scattering in optical fibers. **[8]**

b) Explain Micro bending and Macro bending in optical fiber. Also explain what the critical bending radius for an optical fiber means. **[9]**

Q5) a) Briefly describe the processes by which light can be emitted from an atom. Discuss the requirements for population inversion in order that stimulated emission may dominate over spontaneous emission. Illustrate your answer with an energy level diagram of a common nonsemiconductor laser. **[9]**

b) Compare P-I-N diode with avalanche photodiode. **[8]**

OR

Q6) a) Describe what is meant by the fusion splicing of optical fibers. Discuss the advantages and drawbacks of this jointing technique. **[8]**

b) Discuss the principles of operation of the two major categories of demountable optical fiber connectors. Describe in detail a common technique for achieving a butt jointed fiber connector. **[9]**

SECTION-II

Q7) What are the advantages of Intensity Modulated Optical Sensors (IMOS)? Describe following techniques of sensing which is based on intensity modulation. Also enlist different parameters, which can be sensed by using these techniques. **[18]**

a) Evanescent field.

b) Coupling.

c) Encoding based position sensors.

Q8) a) What do you understand by intrinsic and extrinsic Optical fiber Sensors? With the aid of suitable diagrams describe one Extrinsic Optical Fiber Sensor. How do you calibrate this sensor? **[10]**

b) What are the advantages and drawbacks of Optical Fiber Sensors? **[8]**

Q9) a) Explain working of Fiber Bragg Grating. Also explain the manufacturing technique of Fiber Bragg Grating. **[8]**

b) Explain working of Distributed Optical Fiber stress-strain sensor. **[8]**

OR

Q10) a) What are the advantages and disadvantages of Distributed. Optical Fiber Sensing? Explain role of Optical Time Domain Reflectometer (OTDR) in distributed Optical Fiber Sensing. **[8]**

b) How different parameters are sensed by using Fiber Bragg Grating. **[8]**

Q11) a) Sketch the major elements of a fiber amplifier and describe the operation of the device. Indicate the benefits of fiber amplifier technology in comparison with that associated with silicon laser amplifiers (SLAs). **[10]**

b) Write a note on 'Integrated Optics'. **[6]**

OR

Q12) a) Give major reasons which have led to the development of optical amplifiers, outlining the attributes and application areas for these devices. **[8]**

b) Explain with the aid of suitable diagrams, following integrated optical devices: **[8]**

i) Beam splitter.

ii) Directional coupler.

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P 1110   **[4064] - 191**

B.E. (Chemical)
PETROLEUM REFINING

(2003 Course) (409341) (Sem. - I)(Elective - I)

Time : 3 Hours]   *[Max Marks : 100*

Instructions to candidates :

1) *Answer three questions from Section I and three question from Section II.*
2) *Answers to the two section should be written in separate answer boooks.*
3) *Neat diagrams must be drawn wherever necessary.*
4) *Figures to the right indicate full marks.*

SECTION-I

Q1) With neat sketches, explain in details the various steps in pre-treatment of crude oil.   **[16]**

OR

Q2) Draw neat diagram and write about different types of crude oil exploration.   **[16]**

Q3) Mention significance of desalting of crude oil. Describe in details single and two stage desalting system.   **[16]**

OR

Q4) a)   Write a note on chemical composition of petroleum.   **[8]**

b)   Explain any one method used for dewaxing of lube oil.   **[8]**

Q5) With reactions involved, explain procedure and advantages of Hydrocracking.   **[18]**

OR

Q6) With neat diagram, discuss in details on vacuum distillation.   **[18]**

SECTION-II

Q7) Draw neat sketch and write in details about absorption method for production of LPG.   **[16]**

P.T.O.

Q8) Explain with flowsheet the process of delayed coking. **[16]**

Q9) What is reforming? Note the process and state applications. **[16]**

OR

Q10) a) Provide classification of hydrocarbons. **[8]**

   b) Discuss Hydro-desulphurization. **[8]**

Q11) a) Note various additives used in petroleum process. **[8]**

   b) Write transportation methodologies of petroleum products. **[10]**

OR

Q12) Explain role of refinery in power generation. Write application of refinery products as fuel for power generation. **[18]**

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P624   **[4064]-201**

B.E. (Petroleum Engineering)
RESERVOIR ENGINEERING - I
(Sem. - I) (2003 Course) (412381)

Time : 3 Hours]   [*Max. Marks : 100*

Instructions to the candidates:

1) *Answers to the two sections must be written in separate answer books.*
2) *Questions No. 2 (two) and 8 (eight) are compulsory.*
3) *Figures to the right indicate full marks.*
4) *Neat diagrams should be drawn wherever necessary.*
5) *Use of a non-programmable calculator, log-log, semi-log paper is allowed.*
6) *Assume suitable data, if necessary.*

SECTION - I

Q1) a) What is reservoir engineering and how are its objectives accomplished?**[8]**

b) Explain in detail classification of reserves and how are they calculated?**[8]**

Q2) a) Derive the material balance equation for a reservoir producing with combination of all the drive mechanisms. **[8]**

b) From this derive the Havelena Odeh linearization process. **[10]**

Q3) Derive the material balance equation for an oil reservoir operating rock and fluid expansion. **[16]**

Q4) State and explain the type curves used in decline curve analysis. **[16]**

SECTION - II

Q5) Derive the diffusivity equation in cartesian coordinate system. **[16]**

Q6) For a pressure drawdown test explain the terms ETR, MTR and LTR on a semi log, log plot and on the derivative plot. **[16]**

P.T.O.

Q7) Explain Pseudo pressure and why it is better in a buildup test.   **[16]**

Q8) Write short notes on
    a) Type curves
    b) Interference test analysis.   **[18]**

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P 625   [4064] - 204

B.E. (Petroleum Engineering)
NATURAL GAS ENGINEERING
(2003 Course) (412384) (Sem. - I)

Time : 3 Hours]   *[Max Marks : 100*

Instructions to candidates :

   1)   Answers to the two sections must be written in separate answer books.

   2)   Answer three questions from each section.

   3)   Figures to the right indicate full marks.

   4)   Neat diagrams should be drawn wherever necessary.

   5)   Use of a non-programmable calculator is allowed.

   6)   Assume suitable data if necessary and clearly state it.

SECTION-I

Q1) Define Pc and Ppc. Draw the graph of viscosity. Cg and z factor versus pressure and explain.   **[16]**

Q2) What is an inflow performance curve for a gas reservoir? What is an outflow performance curve? What is a tubing intake curve? Plot all on the same graph? What is the usefulness of this graph? Explain in detail with equations.   **[16]**

Q3) Explain any two methods to find flowing and static bottom hole pressure. **[18]**

Q4) Explain all the constants in the gas flow meter equation.   **[16]**

SECTION-II

Q5) a)   What is the criteria for choosing a H2S removal process?   **[16]**

      b)   Draw a process flow diagram showing the removal of carbon dioxide.

Q6) Derive an expression to find equivalent diameter for series pipes. **[16]**

Q7) a) Draw a diagram of a centrifugal compressor and name its parts. **[10]**

   b) Write a note on reciprocating compressors. **[6]**

Q8) Write short notes on: **[18]**

   a) Pipelines.

   b) Mollier charts in compressor design.

   c) Gas well testing.

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Total No. of Questions : 8]   [Total No. of Pages :2

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B.E. (Petroleum Engineering)
RESERVOIR ENGINEERING - II
(2003 Course) (Sem. - II) (412388)

Time : 3 Hours]   *[Max Marks : 100*

Instructions to candidates :

1) Answers to the two sections must be written in separate answer books.

2) Question No. 4 (four) and 7 (seven) is compulsory.

3) Solve 3 questions from section I & 3 questions. from section II.

4) Figures to the right indicate full marks.

5) Neat diagrams should be drawn wherever necessary.

6) Use of a non-programmable calculator, log-log, semi-log paper is allowed.

7) Assume suitable data, if necessary.

SECTION-I

Q1) Derive the oil water fractional flow equation.   **[16]**

Q2) Explain all Thermal EOR processes.   **[16]**

Q3) Explain Surfactant Polymer EOR process.   **[16]**

Q4) a) State four elements of Polymer Design and Steam flooding?   **[6]**

 b) Name and explain any one model in Thermal EOR.   **[6]**

 c) Define MMP, CDC, Cosurfactant, Cosolvent, UL and LL phases.
                                                                [6]

SECTION-II

Q5) $\dfrac{\partial^2 p}{\partial x^2} = \alpha \dfrac{\partial p}{\partial t}$ is the given equation for flow in porous media.

Formulate the discretised equation using variable grid blocks.   **[16]**

                                                                P.T.O.

Q6) For the diffusivity equation, formulate explicit, implicit and crank Nicolson equations. **[16]**

Q7) What are the various steps needed for implementation of an EOR project? Give specific variations for different EOR methods and supplement with case studies. **[18]**

Q8) Use Taylors series to derive the finite difference approximation formulas for the Diffusivity equation. **[16]**

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B.E. (Civil)

TRANSPORTATION ENGINEERING - II

(2003 Course) (401009) (Sem. - II)

Time : 3 Hours]   *[Max Marks : 100*

Instructions to candidates :

1) *Answer Q1 or Q2, Q3 or Q4, Q5or Q6 from section I & Answer Q7 orQ8, Q9 or Q10, Q11 or Q12 from section II.*

2) *Answers to the two sections sohuld be written in separate books.*

3) *Neat diagrams must be drawn wherever necessary.*

4) *Figures to the right indicate full marks.*

5) *Use of logarithmic tables, electronic pocket non-programmable calculator and steam tables is allowed.*

6) *Assume suitable data, if necessary.*

SECTION-I

Unit-I

Q1) a) How the Indian Roads have been classified? Discuss. Also, explain with suitable sketches any 3 road patterns.   **[7]**

   b) Write a brief note on -   **[6]**
   (i) Traffic control devices
   (ii) Traffic volume studies

   c) State clearly the salient features of Bombay Road development plan.   **[4]**

OR

Q2) a) Describe the steps involved in determining the different categories of road lengths by Lucknow Road development plan.   **[7]**

   b) Write short note on-   **[6]**
   (i) Traffic capacity studies.
   (ii) Accident studies.

   c) With the aid of a sketch, explain the concept of star and grid road pattern.   **[4]**

Unit-II

Q3) a) Discuss the various obligatory points which control the highway alignment giving examples.   **[4]**

P.T.O.

b) Write a note on various stages of Engineering surveys. **[4]**

c) State and explain the types of gradients. Also, mention the reccommended values as per Indian Roads congress. **[6]**

d) With the help of a suitable sketch, carry out the mechanical widening of roads on horizontal curves. **[3]**

OR

Q4) a) Discuss the basic requirements of an Ideal alignment and factors controlling them. **[4]**

b) State the necessity of highway drainage and how these are achieved ? Discuss. **[4]**

c) A passenger car is moving at a derign speed of 80 kmph, on a National highway at an ascending gradient of 2%. Assuming the values of "t" and "f" equal to 2.5 secs and 0.348 respectively, determine the stopping sight distance for. **[6]**

i) Two lane road with two way traffic.

ii) Single lane road with two way traffic.

d) State the reasons for widening of pavements on horizontal curves. **[3]**

Unit-III

Q5) a) Ennumarate (Highlight) the various points as per I.R.C, for the CBR method of design reccommended in IRC : 37 - 1970. **[5]**

b) Explain the following with suitable sketches. **[7]**

(i) Abrasion test on aggregate sample.

(ii) Penetration test on bitumen sample.

c) How Rigid pavement is distinguised from Flexible pavement ? Also, explain the westergaard analysis of wheel load stresses in case of rigid pavements. **[4]**

OR

Q6) a) Discuss in brief the factors affecting the design of pavements in general. **[4]**

b) State clearly any 4 important tests that are to be conducted on Aggregate and Bitumen samples with their importance. **[4]**

c) Write a neat labelled sketch of Ductility test apparatus with its auessories. **[4]**

d) State clearly the importance of Dowel bars and Tie bars Used during the constreution of Joints with suitable neat sketch in case of C.C. roads. **[4]**

SECTION-II

Unit-IV

Q7) a) Describe the following terms [8]

   i) Minimum circling Radius.

   ii) Minimum Turning Radius.

   iii) Seperation clearance.

   iv) Aircraft capacity.

b) Define clearly the term "Effective Gradient" and heve find the effective gradient of a runway from the following data which refers to the proposed Longitudinal section of runway. Draw a neat sketch also. [5]

End to End Runway	Gradient (%)
0.0 to 5 chains	+ 0.75
5.0 to 12 "	− 1.10
12.0 to 16 "	− 0.80
16.0 to 22 "	+ 1.20
22.0 to 30 "	+ 0.60
30.0 to 34 "	− 0.50

you may take onemetric chain is of 30m length.

c) How runway orientation should be done ? Discuss with suitable figure. [4]

OR

Q8) a) With the help of a neat sketch, explain the three controls used to monitor the aircraft movements in air. [6]

b) Explain the following terms. [4]
   i) Airport reference temperature.
   ii) Cross wind component.
   iii) Airport capacity.
   iv) Calmperiod.

c) Find the length of Runway required from the following data. [7]
   i) Basic runway length = 1800 mtr.
   ii) Site devation is 800 mtr above m.s.l.
   iii) Effective gradient is 0.65%.
   iv) Aerodrome reference temp. = 19⁰C. Also apply usual checks.

Unit-V

Q9) a) Write short notes on- **[8]**
   i) Economic span.   ii) Identification of bridges.
   iii) IRC class-A type loading.   iv) Abutment pier.

   b) Draw an illustrative sketches of **[6]**
   i) Abutment for an RCC bridge.
   ii) Dumb-bell pier.
   iii) Cylinder pier

   c) Write a brief note on wing walls **[3]**

OR

Q10) a) Write a note on **[4]**
   i) Remedial measures to reduce the effect of scour.
   ii) Necessity of Free board and clearance.

   b) State clearly how the detail classification of bridges are made. **[5]**

   c) A bridge is proposed to be constructed across an alluvial stream carrying a discharge of 425 m^3/sec Assume Lay's siltfactor equal to 1.100. Find the Depth of scour to be maximum when the bridge consists of 2 spans of 40m each. **[5]**

   d) Write a brief note on determination of design discharge. **[3]**

Unit-VI

Q11) a) What is scupper ? When it is constracted ? Also draw an illustrative sketch. **[4]**

   b) With the aid of a neat sketch describe the advantage of **[6]**
   i) Cut boat bridges   ii) Swing bridges.

   c) Write a note on functions of bearings **[3]**

   d) How maintenance of bridges are carried out ? Describe. **[3]**

OR

Q12) a) Draw the illustrative sketches of **[6]**
   i) Pipe culvert   ii) Cable stayed bridges.
   iii) Expansion bearing.

   b) Briefly describe any two methods of errection of bridges. **[4]**

   c) Write short note on- **[6]**
   i) Suspension bridges   ii) Bascule bridges.
   iii) Importance of bearings for bridges.

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B.E. (Petroleum Engineering)
PETROLEUM ECONOMICS
(2003 Course) (Elective - II) (Sem. - II) (412391)

Time : 3 Hours]   *[Max Marks : 100*

Instructions to the candidates :

1) Answers to the two sections should be written in separate books.
2) Question 1 and 6 are compulsory. Attempt any one question from other questions each from section I and II.
3) Use of graph paper is allowed.
4) Figures to the right indicate full marks.
5) Assume additional data if necessary.

SECTION-I

Q1) a) Oil production history is given for a field which is under consideration for procurement. Details of production profile and spent expenditures are given in the following table. The company management is interested in redevelopment of this field and shall go for production up to an economic limit of 1000 BOPD. **[15]**

The anticipated production beginning from year 14 is given in the table.

Year	Production, BOPD	Exploration costs,$MM	Development costs, $MM	Operating costs,$MM
1		130		
2		130		
3			240	
4	7124		240	13
5	7124			13
6	7124			13
7	7124			13
8	13425			24.5
9	13425			24.5
10	10100			18.45
11	8878			16.2
12	7616			13.9
13	6410			11.7
Redevelopment $ 50 MM				
14	8878			
15	7616			
16	6410			

Table 1 for Q 1.A and Q 6A.

P.T.O.

How much oil was produced during first contract and subsequently will be produced during second contract? What is the OOIP, if original recovery of oil was 24%? How much is the total recovery percent if additional anticipated oil production is taken into consideration? Calculate time required to reach economic limit after redevelopment.

b) Explain any one decline curve with proper equations and diagram. **[10]**

Q2) a) Current oil price for the given project is $ 72.25. It is anticipated that the price will increase at a rate of general inflation, which is forecast to be at the rate of 4.25% per year for first three years and then drop to an annual rate of 3.75% thereafter. **[7]**

The producible oil has lower API than that brand oil along with higher sulphar and TAN content, thus leading to a price differential of 7.25% with respect to brand oil.

Develop a forecast for oil price for brand oil and the oil under consideration for a span of eight years.

b) Write notes on **any two** of the following **[18]**
   i) Crude oil benchmark blends and oil differential.
   ii) Oil price elasticity and effects on oil importing countries.
   iii) Reserves auditing.
   iv) National oil companies and International oil companies.

Q3) a) Three attractive proposals are submitted for the perusal of the management of an oil company. Risk and uncertainty factors are same for all proposals. **[15]**

Table 2 for Q 3 A

Details	A (MM $)	B(MM $)	C(MM $)
Initial investment	1.8	2.2	3.1
Working capital investment	18,000	20000	27,000
Salvage Value	1,80,000	2,20,000	3,00,000
Service life	5	5	5
Annual cash flows	Given below	7,60,000 constant	1.05 constant

Annual cash flow for A is $ 5,60,000 6,00,000 6,40,000 6,90,000, and 7,00,000 for years 1, 2, 3, 4 and 5 respectively.

Company demands

i)   Minimum 12.5% Rate of Return (ROR) on initial capital investment,

ii) End of year costs and profit for time value of money interpretations.

Using above data, which proposal should be given preference by using

i)   Rate of Return (ROR) on initial investment (Incremental analysis),

ii) Minimum Payout Period. and

iii) Net Present Value (NPV).

b) Write notes on **any two** of the following   **[10]**

i)   Investment Yardsticks,
ii) Components of break even analysis,
iii) Sensitivity Analysis.
iv) Time value of money.

SECTION-II

Q4) a) An oil and gas exploration and development company would have a collection of assets with an associated expected value and an uncertain level of risk. Consider the following investment opportunities that might be available to the company with a current interest in producing fields.   **[10]**

Asset	Opportunity	Total Investment (M = 10^6 $)
A	Wildcat well on exploration permit	$ 80 M
B	Exploration project adjacent to producing field	$ 40 M
C	Infill drilling prospect in producing field	$ 60 M

Table 3 for Q 4 A

If the current cash flow forecast indicates a budget of $ 80 M available to reinvest next year, which is the best way to spend money acknowledging the factors of uncertainty and risk.

i)   100% opportunity in C and 50% opportunity in B.

ii) 80% opportunity in C, 30% opportunity in B and 25% opportunity in A.

iii) 50% opportunity in C, 75% opportunity in B and 25% opportunity in A.

Justify your decision with suitable arguments for each alternative.

b) Initial cost of the completely installed reactor is $ 40,000 and its salvage value towards the completion of useful life is $ 4000. Service life of the reactor is 6 years. Calculate its depreciation using Straight Line (SLD), sum of Years Digit (SYD) and Double Declining Balance (DDB) methods. **[15]**

Prepare a plot of book value against number of years and compare the results obtained with different methods.

Q5) a) An oil and gas company is evaluating a drilling prospect based on data available on a wildcat well in a promising area of complex stratigraphic and heterogenic lithological control. **[15]**

* The leased area has an option of size variation from 50 Km^2 to 100 Km^2 though a central potion of 70 Km^2 is considered as most promising for leasing.

* The net pay thickness also shows variation from 20 M to 40 M with a thickness of 30 M particularly in the central part is treated as most likely to be oil bearing.

* Recovery in the proposed area is anticipated between 500 bbl/ Km-M to 1500 bbl/Km-M with 1000 bbl/Km-M recovery is most likely.

* Well spacing is 10 Km^2 per well and approximate development cost is around $ 2 MM. The net revenue is assumed to be $ 15/ bbl after taxes.

Experts in the company feels that in the complex area like this, development cost would show marked variation than anticipated.

* Engineers' estimate that the development cost would be $ 1.5 MM/well and under abnormal circumstances, the cost would raise even up to $ 4 MM Rs/well.

* The probability of $ 2 MM/well, $ 1.5 MM/well and $ 4 MM/ well is 0.60, 0.15 and 0.25 respectively.

* Experts also feel that the probability of drilling a dry well is 0.850 and if hydrocarbons are discovered then the probability of finding minimum, most likely and maximum reserves would be 10%, 75% and 15% respectively out of remaining 0.150.

Management of the company has also kept an option of either leasing out the property to other company and obtain Overriding Royalty Interest (ORI) on the net revenue earned. Or participate in the project with reducing working interest (35%) and proportional risk.

* If company management is opting out of risk, and would like to enjoy only ORI then the NPV for finding minimum , most likely and maximum would be 0.123, 3.12 and 17.25 respectively.

* In case of 35% wI, all relevant values are proportionally decreased.

Decision has to be based on Expected Monetary Value (EMV).

Construct decision tree showing all alternatives available, solve the same and justify your answers with proper calculations.

What is your preferred decision?

b) Write notes on **any two** of the following [10]

i) Reserves accretion and discovery of field size scenario in past 20 years.

ii) Profitability in projects and equivalence of field size in different countries within the framework of Production sharing contract.

iii) Petroleum Accounting system.

Q6) a) Use only the production i.e. time span of 1 to 13 years given in Table 1 for the calculations involved in this question. [20]

Following are the assumptions for the calculations:

i) Oil price is $ 72 /bbl and is constant throughout the project tenure.

ii) Royalty is 10% per year on annual production,

iii) Cost recovery is 100% on net revenue,

iv) Government share in Profit Petroleum is 60%

v) Hurdle rate is 12%, and

vi) Income tax is 30%,

Prepare a tabular form giving details of annual production, cumulative production, expenditure, gross revenue, royalty, net revenue, cost recovery, profit petroleum,government share and operator share, tax, profit for operator, NPV for operator BFIT and AFIT.

Calculate distribution of one barrel or equivalent $ 72 using the assumptions given above. Show this calculation for each deduction.

How much is the profit for contractor and total share of government in the calculation of one barrel?

b)   Give a generalized classification scheme of petroleum Fiscal system. **[5]**

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B.E. (Petrochemical)
PROCESS DYNAMICS AND CONTROL
(2003 Course) (Sem. - I) (412404)

Time : 3 Hours]   [*Max. Marks : 100*

Instructions to the candidates:

1)   *Answer any 3 questions from each section.*

2)   *Answers to the two sections should be written in separate books.*

3)   *Figures to the right indicate full marks.*

4)   *Use of logarithmic tables slide rule, Mollier charts, electronic pocket calculator and steam table is allowed.*

5)   *Assume suitable data, if necessary.*

SECTION - I

Q1) a) Discuss the objectives and benefits of process control with help of suitable examples. **[6]**

   b) Dynamics of a system can be represented by following set of equations:

$$\frac{dx_1}{dt} = x_1 + 3.9x_2 \qquad \text{with } x_1(0) = 0$$

$$\frac{dx_2}{dt} = 2x_1 + x_2 + 3.8 \qquad \text{with } x_2(0) = 0$$

   i)   Use Laplace transforms to obtain corresponding algebraic equations.

   ii) Solve obtained algebraic equations using Cramer's rule.

   iii) Use Heaviside expansions for the roots and subsequently report the solutions in time domain. **[10]**

Q2) a) Develop the mathematical expressions of two non-interacting tanks placed in series. Discuss the dynamics of the system. **[8]**

   b) With help of neat sketch explain the proportional, derivative and integral modes of a PID controller. **[8]**

P.T.O.

Q3) a) What are Servo and Regulatory control problems-Discuss with help of neat diagram. **[6]**

b) What is linearization? Why liberalized approximate models are useful for process control purposes? **[6]**

c) Define following with help of neat diagrams:
Decay Ratio, Damping Factor, Rise Time, Response Time **[6]**

Q4) a) Density of ideal gas is function of pressure and temperature and can be represented by:

$$\rho = \frac{M\,p(t)}{RT(t)},$$ where symbols have their usual significances.

i) Derive the overall linerlized function for density (ρ).

ii) If M = 32, T = 500 K, p = 101.3 kPa and R = 8.314 (kPa.m^3)/ (kmol.K), obtain the density.

iii) Calculate density of the gas at 154.2 kPa and 432 °C temperature with help of derived linearized equation. **[8]**

b) Derive the expression for transfer function of a thermometer along with thermo well. **[8]**

Q5) a) Derive transfer function for output to input (F_{out}/ F_{in}) of the following system. Obtain the final response in time domain as well. **[8]**
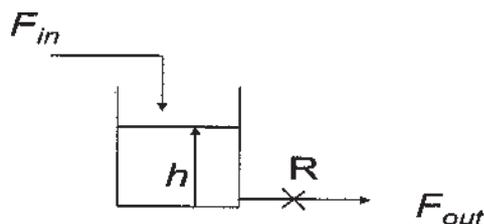
b) Find the overall transfer function of the following system: **[8]**
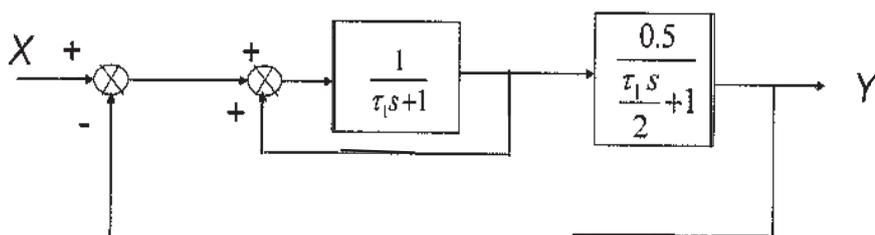
SECTION - II

Q6) a) Calculate Amplitude Ratio and Phase Angle for overdamped 2nd order system with transfer function: $G(s) = \dfrac{4}{(0.8s+1)(2s+1)}$ **[8]**

b) Draw Bode plots for an open-loop process, whose dynamics can be represented by: $G_{OL} = 25K_C \left(\dfrac{1}{11s+1}\right)\left(\dfrac{1}{5s+1}\right)$

The value of Gain K_C can be assumed to be 0.6 **[8]**

Q7) a) What are different time- integral performance criteria generally used for Controller Tuning? Explain in brief. **[6]**

b) Explain PLC based control and cite its advantages. **[4]**

c) With help of suitable example explain the application of Ratio Control in the Refinery. **[6]**

Q8) a) What are the major advantages of Routh-Hurwitz criterion for examining stability of a system. **[6]**

b) Consider a feedback control system having the characteristic equation.**[6]**

$$s^3 + 2s^2 + (2 + K_C)s + \frac{K_C}{\tau_1} = 0$$

i) Derive condition of stability for the system with help of Routh - Hurwitz Criterion.

ii) If $K_C = 45$ and $\tau_I = 0.4$ comment on stability.

c) With help of diagram explain Gain Margin and Phase Margin. **[4]**

Q9) a) With help of sketch explain transformations of Discrete Signals to Continuous and vice-versa. In this context discuss necessity of Z-transform. **[8]**

b) Plot the root locus diagram for the following process: **[8]**
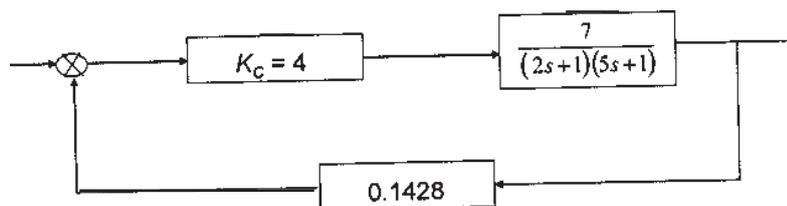
Q10) Write short notes on: **[18]**

      i)   Cascade Control Strategy.

      ii)   Ziegler-Nichols Controller Settings

      iii)   Feed-forward Control vs. Feed-back Control

      iv)   Split Range Control

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B.E. (Petrochemical)
PROCESS ECONOMICS AND PROJECT ENGG.
(2003 Course) (Sem. - II) (412409)

Time : 3 Hours]   [*Max. Marks : 100*

Instructions to the candidates:

1) *Answer any three questions from each section.*
2) *Answers to the two sections should be written in separate books.*
3) *Neat diagrams must be drawn wherever necessary.*
4) *Figures to the right indicate full marks.*
5) *Use of logarithmic tables electronic pocket calculator and steam tables is allowed.*
6) *Assume suitable data, if necessary.*

SECTION - I

Q1) Answer <u>any three</u> from the following :   **[18]**

a) An equipment costs Rs. 2,70,000/- and will have a scrap value of Rs. 45,000/- at the end of its useful life of 10 years. If the interest is compounded at 10% year, what are the cost of replacement, the present worth and capitalized cost?

b) Discuss in brief the practical factors you will consider in alternative investment and replacement studies for a refinery project.

c) The annual production costs for a plant are Rs. 46.5 lakhs, while the sum of annual fixed charges; overhead charges and general expenses are Rs. 29 lakhs. Determine the break-even point, in units of production per year if the total annual sales are Rs. 79.8 lakhs and the product sells at Rs. 520 per unit.

d) List the factors to be considered in the evaluation of capital requirements for a process plant.

OR

Q2) a) Discuss the types of cost indices available in the Chemical Engineering literature. Discuss the importance of these cost indices for cost estimation of chemical engineering equipment.   **[9]**

P.T.O.

b) A process plant has an initial investment of Rs. 50 lakhs. The estimated salvage value is Rs. 4 lakhs. It has a life of 6 years. Estimate the book value of the plant after 5 years by: **[9]**

   i) Straight line depreciation method

   ii) Declining balance method and

   iii) Sinking fund method with a sinking fund interest rate of 12%

Q3) a) The annual fixed charges for the plant are Rs. 1,00,000 and the variable cost is Rs. 1,40,000 at 70% capacity with net sales of Rs. 2,80,000. **[9]**

   i) What is the BEP in units of production is the selling price per unit is Rs. 40.

   ii) If the product produced above BEP is dumped abroad at a price 15% more than the variable cost, what is the new gross profit at 100% capacity?

   b) Explain the various risks involved in project management? Bring out the various techniques that can be used to handle these risks with emphasis on BEP Technique? **[7]**

OR

Q4) a) Two projects A and B have initial capital investment of Rs. 10,00,000 each the cash -inflows of the two projects are as under:

cash in flows

Year	Project A	Project B
1	Rs. 4,00,000	Rs. 2,50,000
2	Rs. 5,00,000	Rs. 3,50,000
3	Rs. 1,00,000	Rs. 2,50,000
4	Rs. 25,000	Rs. 1,50,000
5	Rs. 25,000	Rs. 2,00,000
6	Rs. 20,000	Rs. 1,75,000

Choose one out of the two projects or the basis of Pay-Back period Method of evaluation. Comment on the limitation of Pay-Back period method? **[8]**

b) The following data are available for two reactors from a petrochemical plant:

Item	Reactor (Mild Steel)	Reactor (Stainless Steel)
Installed cost	Rs. 2,50,000/-	Rs. 4,50,000/-
Salvage value	0	0
Service life	3	?
Interest rate (i)	12%	12%

If the capitalized cost is same for both the reactors, estimate service life for stainless steel reactor. **[8]**

Q5) a) The following data presents the ratios pertaining to MRP Petrochemicals Ltd., Pune for the ear ending 31st March 2011:

   i)   Annual sales   :   Rs. 40,00,000

   ii)   Sales to net worth   :   4 times

   iii) Current liabilities   :   50%

   iv)   Total debt to net worth   :   80%

   v)   Current ratio   :   2.2 times

   vi)   Sales to inventory   :   7 times

   vii) Average collection period :   40 days

   viii) Fixed assets to net worth   :   70%

   From the above information, prepare the balance sheet with as many details as possible. Assume on sales on credit. **[10]**

   b) What is present value method? How it is useful in comparing alternatives. **[6]**

OR

Q6) Write short notes on **[16]**

   a) Una cost and capitalized cost

   b) Taxes and Insurance

   c) Estimates of Total Product Cost

Q7) Formaldehyde is an important raw material in the manufacture of dyes, cosmetics, explosives and polymer used in making rigid plastic objects such as telephones and dishes.

The principal method of producing formaldehyde is the oxidation reaction of methanol on a stationary silver catalyst in a fixed-bed reactor. Fresh and recycled methanol are mixed and fed to a vaporizer operating at 101.3-kPa pressures. Ambient air is drawn into a blower and bubbled into the vaporizer through a sparger. The mixture leaves the vaporizer saturated with methanol and is heated to 145°C,

Saturated Stream at 415 kPa is metered into the air-methanol mixture, and the combined stream then flows to the reactor, where the feed gas passes through the catalyst bed. The bed consists of pure silver crystals, 0.5 to 3 mm in diameter, packed to a depth of about 3 cm, and supported on a stainless steel wire mesh. The process conditions provide a conversion of 70 weight percent of the methanol entering the reactor.

Gases leaving the reactor are processed in downstream units to produce (for storage) 3 tonnes of formaldehyde solution per year with a composition of 37-wt% formaldehyde 1 wt% methanol, and the remainder water. There will be 350 plant-operating days per calendar year.

As par of preliminary plant review, you have been asked to answer the following questions: **[18]**

a) Write down the chemical reaction equation describing formaldehyde production by methanol oxidation. What are the two main extraneous by products expected from this reaction?

b) What are the three main hazards expected in this plant? Suggest corresponding safeguards or remedial measures for these hazards.

c) Draw a simplified process flow diagram showing the main unit operations for obtaining the final product from the raw materials (show process units as blocks with appropriate names for the unit operations involved).

d) Draw P & ID for any one major piece of equipment used in above Process flow sheet.

OR

Q8) a) Why is the selection of the correct material important, and what are some of the constraints one must deal with when making choice. Consider different situations such as for example a crude tower in an oil refinery or a vessel in a vaccine-manufacturing unit. **[8]**

b) What are process utilities? Briefly discuss important utilities required in a typical petrochemical complex/refinery unit. **[10]**

Q9) a) Any successful design project depends on effective project management. There is no single correct way to manage a project but there are four basic steps:

i) Define the project

ii) Create a project plan

iii) Track and maintain the project plan

iv) Close the project

You are a Process Engineer Incharge of preparing the process design report for methanol from syngas unit. Give a description of how you would manage this project giving some detail of the various aspects of a modern environmentally acceptable design. **[8]**

b) Make a proforma for the specification Binary Distillation Column. **[8]**

OR

Q10) a) Discuss in brief the following safety terms: **[10]**

i) HAZOP

ii) Fault tree analysis

iii) Trip and interlock system

iv) HAZAN

b) Explain Plant shutdown and emergency procedure. **[6]**

Q11) Description of various activities is listed below to set up a refinery in one of the MIDC area near Mumbai. **[16]**

a) Decide the sequence of operations

b) Draw the network and determine the critical path

c) Calculate the earliest expected time and latest allowable time to complete the given refinery project.

Data:

	Description of activity	Time duration in weeks
1	Detailed Engineering layout	4
2	Basic process design	3
3	Inspection and Testing	10
4	Procurement of pressure vessels and equipment	20
5	Procurement of material related to pipeline and structure	12
6	Procurement of controls and electric goods	16
7	Civil and structural works	10
8	Welding	6
9	Dummy	0
10	Electrifications	3
11	Trials and Inspections	1
12	Inspections and Testing	10

OR

Q12) Write short notes on : **[16]**

a) Plot plan and equipment layout

b) Capacity bottleneck analysis and debottlenecking

c) Anatomy of Chemical Engineering Projects.

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P 481   **[4064] - 233**

B.E. (Polymer Engineering)
POLYMER COMPOSITES AND BLENDS
(2003 Course) (409363) (Sem. - I)

Time : 3 Hours]   *[Max Marks : 100*

Instructions to candidates :

1)   Answers to the two sections should be written in separate books.

2)   Draw neat diagrams wherever necessary.

3)   Numbers to the right indicate full marks.

4)   Assume suitable data if necessary.

5)   Use of logarithmic table electronic pocket calculators is allowed.

SECTION-I

Q1) a) Discuss in detail all E's or advantages in employing polymer blend technology. **[6]**

b) Classify the polymer alloys and blends on the basis of Miscibility and Methods of preparation with one example. **[8]**

c) Explain the term Polymer alloy with its importance. **[4]**

OR

Q2) a) Explain different Polymeric Modifier used to improve the following properties such as Impact Strength, Chemical Resistance, Heat Deflection Temperature, Flame Resistance and barrier properties. **[8]**

b) Discuss the significances related to processing via polymer blend technology. **[4]**

c) Discuss the advantages and Disadvantages of the following engineering Polymeric modifier: 1) Polycarbonate   2)   Acrylonitrile butadiene styrene (ABS) **[6]**

Q3) a) Define the term Spreading coefficient and Discuss with examples the method of Compatibilization via addition of block or graft copolymers. **[10]**

b) Discuss with suitable diagram all function of Compatibilization. **[6]**

OR

P.T.O.

Q4) a) Discuss with necessary diagram the effect of temperature on the Phase stability. **[6]**

b) Explain the importance of Molecular weight parameter with necessary diagram on the miscibility of polymer blend systems. **[10]**

Q5) a) Write a short note on Semi-IPN, Sequential-IPN. **[6]**

b) Discuss in detail the applicable models to understand the Rheology of Miscible Blend systems. **[10]**

OR

Q6) a) Write a note on any one Commercial polymer blend involving engineering polymer. **[6]**

b) Discuss in detail the applicable models to understand the Rheology of Immiscible Blend systems. **[10]**

SECTION-II

Q7) a) What are the selection criteria's used for Epoxy resin used in composites and list the various commercial grades of the same and brief about diluents used in epoxy resins ? **[8]**

b) What is Reinforcement and list the different types and forms of the reinforcing materials ? Compare the Aramide Fiber reinforcements with Boron Fiber Reinforcements. **[6]**

c) Define the term composite and explain in detail the different constituents of the composite with their functions. **[4]**

OR

Q8) a) State various Commercially available unsaturated thermosetting polyester resins forms and explain any four grades of the same along with their formulation and applications. **[8]**

b) Explain the three stages of the curing reaction of the unsaturated thermosetting polyester resin with its significances. Discuss the various catalyst used in unsaturated thermosetting polyester resin curing and classify them and explain any one in detail. **[10]**

Q9) a) What is Resin transfer Molding process and name any two products manufactured by the same process and compare the same with vacuum bag Forming process. **[8]**

b) What are different winding techniques used in filament winding? State and explain any four process parameter that affect the quality of filament winding products. **[8]**

OR

Q10) a) Explain in detail Hand lay up process and state what are the products manufactured by the same technique. **[8]**

b) What is pressure bag forming process and differentiate between vacuum bag Forming and pressure bag forming. List any four parameters of Vacuum bag Forming Process. **[8]**

Q11) a) What are Nano composite? How they are classify and compare the Nano composite with conventional composite system. **[8]**

b) Explain in brief the necessity of Maintenance of FRP products? What are the different methods of Maintenance used for the composite?**[8]**

OR

Q12) a) Explain with neat sketch repairing techniques of holes on the composite product accessible from both sides. **[8]**

b) Write a note on trouble Shooting in Pultrusion Process. **[8]**

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P1111   **[4064]-238**

B.E. (Polymer)
ADVANCED POLYMER RHEOLOGY
(2003 Course) (409366) (Elective - I) (Sem. - I)

Time : 3 Hours]   [*Max. Marks : 100*

Instructions to the candidates:
- *1) Answer any <u>three</u> questions from each section.*
- *2) Answers to the two sections should be written in separate books.*
- *3) Neat diagrams must be drawn wherever necessary.*
- *4) Figures to the right indicates full marks.*
- *5) Assume suitable data, if necessary*

SECTION - I

Q1) a) Explain the terms first normal stress difference and second normal stress difference. **[9]**

b) Explain rheopectic and thixotropic fluids with examples. **[9]**

OR

Q2) a) Derive the equation of conservation of momentum. **[8]**

b) Write down the rate of deformation tensor for steady uniaxial extensional flow and steady simple shear flow. Write down the invariants of the tensor. **[5]**

c) Explain elastio nis cous fluids with neat example. **[5]**

Q3) a) Derive an expression for flow of a power law fluid through a capillacy.**[8]**

b) Mention the equations of shear and extensional flow through a wedge shaped die. **[8]**

OR

Q4) a) Write a short note on rheological models used to study extensional flow. **[8]**

b) Explain Hanks criteria and Ryan Johnson's criteria to understand transition between laminar and turbulent flow. **[8]**

Q5) a) Explain the phenomena of stress relaxation and creep assuming the material behaviour based on zenner's model. **[8]**

b) Explain the terms storage modulus and loss modulus. **[8]**

P.T.O.

<center>OR</center>

Q6) a) Explain the time-temperature superposition principle in details. **[8]**

b) Write a note on Reuseis theory. **[8]**

<center>**SECTION - II**</center>

Q7) a) Explain the effect of crystallinity and copolymerization on polymer melt rheology. **[8]**

b) Explain the concept of zero shear viscosity. **[8]**

<center>OR</center>

Q8) a) Explain the concept of activation energy in details. **[8]**

b) Write a note on rheology of immiscible blends. **[8]**

Q9) a) Explain the constructional features of cone and plate and parallel plate rheometers in details. **[8]**

b) Explain the various geometrics used to generate shear flow. **[4]**

c) Discuss the classification of rheometers with suitable examples. **[4]**

<center>OR</center>

Q10) a) Explain the effect of wall slip phenomena on rheological measurements.**[8]**

b) Frequency of rotation and torque data for cone and plate with plate diameter 14 cm and angle 2.5° is given below. Determine the rheological behaviour assuming power law model applies. Determine the power law constants.

Frequency of rotation rad/m	8	35	55	95	190	370	600
Torque N-m	10	18	20	25	28	35	40

[8]

Q11) a) Derive an expression for maximum pressure for flow of molten plastic through calender rolls. **[9]**

b) Derive an expression for force need to compression mold a plate of radius r and thickness H. **[9]**

<center>OR</center>

Q12) a) Derive an expression for drag flow and pressure flow in a single screw extruder. **[10]**

b) Derive an expression for estimation of thickness of a blow molded bottle. **[8]**

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P627　　　　　　　　**[4064]-260**

B.E. (Computer)
ADVANCED COMPUTER ARCHITECTURE AND COMPUTING
(2003 Course) (Sem. - II) (410449)

Time : 3 Hours]　　　　　　　　　　　　　　[*Max. Marks : 100*

Instructions to the candidates:
  1) *Figures to the right indicate full marks.*
  2) *Answers to the two sections should be written in separate answer books.*
  3) *From Section - I, answer (Q1 or Q2) and (Q3 or Q4) and (Q5 or Q6).*
  4) *From Section - II, answer (Q7 or Q8) and (Q9 or Q10) and (Q11 or Q12).*

SECTION - I

Q1) a) Define various scalability metrics and give its significance towards the performance of computer system. **[6]**

   b) Explain how parallelism can be achieved in Uni-processor Architecture. **[10]**

   OR

Q2) a) Which are the classification schemes for parallel computers? Explain any two schemes. **[8]**

   b) What is EPIC? Explain EPIC features of Itanium processor in detail. **[8]**

Q3) a) What is superscalar architecture? Explain with an example of Ultra Sparc. **[8]**

   b) Explain various types of data hazards observed in pipeline processor. How these hazard could be detected and resolved? **[8]**

   OR

Q4) a) Write a detail note on register tagging system. **[6]**

   b) Explain advance pipeline techniques in details- **[10]**

   i) Loop unrolling

   ii) Trace scheduling

P.T.O.

Q5) a) Draw and Explain in brief the programming model of CRAY -1 vector processor. **[10]**

b) State advantages of vector processing over scalar processing. What is vectorizing compiler? Explain any two vector optimizing function. **[8]**

<div align="center">OR</div>

Q6) a) Explain the algorithm to compute Fast Fourier Transform for SMID architecture. **[10]**

b) Compare single stage network and multistage network. Draw a 3 qube network as multistage network. **[8]**

<div align="center">

SECTION - II
</div>

Q7) a) Compare between **[10]**
   i) Cow's and Now's.
   ii) Chip multiprocessing and Multithreading.
   iii) Shared memory system and Distributed memory system.

b) Comment on desirable processor characteristics of Multiprocessor architecture. **[8]**

<div align="center">OR</div>

Q8) a) Explain time shared bus as an interconnection network for multiprocessor system. Discuss daisy chaining arbitration algorithm with neat diagram.
   [10]

b) State Cache write policies used in Cache coherency protocol. Discuss Pentium MESI protocol with its state diagram. **[8]**

Q9) a) What is synchronous and asynchronous message passing in parallel programming? **[8]**

b) What is the necessity of memory consistency models? Explain in brief processor consistency model? **[8]**

<div align="center">OR</div>

Q10) a) Explain different latency hiding techniques used in multithreaded architecture. **[8]**

b) What are the features of data parallel programming? Explain the standard construct available in data parallel programming? **[8]**

Q11) a) State and describe the various communication functions of MPI message passing library. **[8]**

b) Explain how neural network can be used for distributed computing.**[8]**

OR

Q12) a) Discuss and compare the architecture of cluster and grid computing.**[8]**

b) What are the major features of Fortran-90 to be qualified as parallel programming language. **[8]**

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P 606   **[4064] - 271**

B.E. (IT)
INFORMATION SYSTEM SECURITY
(2003 Course) (414441) (Sem. - I)

Time : 3 Hours]   *[Max Marks : 100*

Instructions to candidates :

1) *Answer Q1 or Q2, Q3 or Q4, Q5 or Q6 in section - I and Q 7 or Q8, Q9 or 10, Q11 or Q 12 in section - II.*
2) *Answers to the two sections should be written in separate books.*
3) *Figures to the right indicate full marks.*

SECTION-I

Q1) a) What are the methods to secure the web server. Draw the necessary architecture diagram. **[9]**

b) Explain the design principles of Security. **[9]**

OR

Q2) a) Draw the diagram of network based intrusion detection system & explain . **[9]**

b) Explain in detail Clark-Wilson Integrity model. **[9]**

Q3) a) Explain security policy for email usage in an organization. **[8]**

b) Describe in detail any one security model with hybrid policies, meaning a model which refers equally to confidentiality and integrity. **[8]**

OR

Q4) a) List the different types of access control used in a security policy.**[8]**

b) Explain Digital Signatures in detail. **[8]**

Q5) a) Illustrate the need of Kerbores System. **[8]**

b) Explain at least two popular attacks on internet. **[8]**

<center>OR</center>

Q6) a) Write the Methods of Symmetric and Asymmetric Key Distribution. **[8]**

b) List the benefits of IP sec. What is the difference between transport and tunnel model. What parameter identify a security association.**[8]**

<center>**SECTION-II**</center>

Q7) a) What do understand by Application to Application Security and Link layer security. **[9]**

b) Draw and state the virus hierarchy. **[9]**

<center>OR</center>

Q8) a) Write the short note on biometric security. **[9]**

b) Explain access control mechanisms using examples. **[9]**

Q9) a) Draw and Explain anatomy of Auditing system. **[8]**

b) List and state the fields in Digital Certificate X5090. **[8]**

<center>OR</center>

Q10) a) Compare Symmetric Key and Public Key systems. **[8]**

b) Explain types of Intrusion Detection Systems. **[8]**

Q11) a) Explain Man in the Middle Attack. **[8]**

b) Describe Identity Management Techniques. **[8]**

<center>OR</center>

Q12) a) Write short note on Vulnerability Assessment. **[8]**

b) Write short note on Penetration Methodology. **[8]**

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P 490 **[4064] - 273**

B.E. (IT)

SOFTWARE TESTING AND QUALITY ASSURANCE

(2003 Course) (414444) (Sem. -I)

Time : 3 Hours] *[Max Marks : 100*

Instructions to candidates :

1) *Answer question number 1 or 2, 3 or 4, 5or 6 from section I.*

2) *Answer question number 7 or 8, 9 or 10, 11 from section II.*

3) *Answers to the two sections should be written in separate answer books.*

4) *Neat diagrams must be drawn wherever necessary.*

5) *Figures to the right indicate full marks.*

6) *Assume suitable data, if necessary.*

SECTION-I

Q1) a) What are different levels of testing? Which software components are most suitable for unit testing and why? **[8]**

b) Explain in short any four methods of System Level Testing. **[8]**

OR

Q2) a) What type of skill do you believe should be required of a person being hired as a test specialist? **[8]**

b) Differentiate white box testing & black box testing. **[8]**

Q3) a) Explain in detail Test Plan Template. **[8]**

b) Draw control flow graph for the code given below. Clearly label each node so that it is linked to its corresponding statement. Calculate it's cyclomatic complexity. How can this value be used to measure testability? Describe how cyclomatic complexity number and the flow graph be used to design a set of white box tests for this module that would at least cover all its branches. **[8]**

Module foo ()/* a[] and b[] are global variables*/
begin
int i,x
i=1
read (x)
while (i<x) do begin
a[i]=b[i]*x
if a[i]>50 then

P.T.O.

```
print ("array a is over the limit")
else
print ("ok")
i=i+1
end
print ("end of nonsense")
end.
```

<p align="center">OR</p>

Q4) a) Explain in detail different functions (responsibilities) to be handled in a testing life cycle or process. **[8]**

b) Describe the software defect life cycle. **[8]**

Q5) a) Explain with example the **GQM** method for identifying software measures. **[10]**

b) Write short notes on: **[8]**

i)   Product quality metrics.

ii) In-process quality metrics.

<p align="center">OR</p>

Q6) a) What is customer problem metric? What are approaches to achieve low PUM? **[10]**

b) Explain different types of measurement scales with example. **[8]**

<p align="center">**SECTION-II**</p>

Q7) a) What are the resources required for Usability testing? Explain some metrics to measure software usability. **[8]**

b) Enumerate Ishikawa's Seven Basic Quality Tools. Explain any two in details. **[8]**

<p align="center">OR</p>

Q8) a) What does SQA ensure? What are the goals of SQA activity? **[8]**

b) What is meant by software quality control? Explain the method of measuring software reliability as a software quality attribute. **[8]**

Q9) a) Explain with example the six-sigma measure of software quality. **[8]**

    b) List all the requirements of ISO 9000 and ISO 9001. **[8]**

<div align="center">OR</div>

Q10) a) Explain the software Project Tracking & Oversight (SPTO) KPA of the CMM level 2. **[8]**

    b) How is defect prevention and process change management brought into practice? **[8]**

Q11) Write short notes on any three: **[18]**

    a) Differentiate between web application testing and client/server testing.

    b) Functional testing of Web-site.

    c) Client-Server Testing techniques.

    d) Class testing.

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P 1189   **[4064] - 276**

B.E. (Information Technology)
GIS and Remote Sensing
(2003 Course) (414445) (Sem. - I) (Elective - I)

Time : 3 Hours]   *[Max Marks : 100*

Instructions to candidates :

1) *Solve Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6 from section I.*
2) *Solve Q.7 or Q.8, Q.9 or Q.10, Q.11 or Q.12 from section II.*
3) *Assume suitable data, if necessary.*
4) *Figures to the right indicate full marks.*

SECTION-I

Q1) a) Define GIS. What are 4 M'sof GIS? Explain the term topology. **[8]**

b) What are maps? What is map scale? Explain spatial referencing system. **[8]**

OR

Q2) a) What is grid system? Which grid systems are used in GIS applications. **[8]**

b) What is map projection? Describe different types of map projections. **[8]**

Q3) a) What is raster data representation? Explain it with suitable example.**[8]**

b) What are the types of vector GIS models? Describe any two.   **[8]**

OR

Q4) a) What is spatio-temporal data? Explain different types of representations used for spatio-temporal data. **[8]**

b) Explain Spaghetti model and Topological model.   **[8]**

Q5) a) What is overlay analysis? Describe the process of digital terrain modeling. **[10]**

b) Which are the main tasks of DTM system? Explain Traingulated irregular network model. **[8]**

Q6) a) What are the various guidelines for digitization in GIS? **[10]**

b) What are the common errors in GIS databases? How can they be prevented or corrected? **[8]**

SECTION-II

Q7) a) Explain radar principle with required formula. What are the factors affecting microwaves. **[8]**

b) Explain the Synthetic Apeture Radar (SAR) system. **[8]**

OR

Q8) a) Describe electromagnetic spectrum along with Maxwell's theory and Quantum theory. **[8]**

b) Explain the energy interaction with water body on the earth. Derive the fundamental equation by which the conceptual design of remote sensing technology is built. **[8]**

Q9) a) What are different sensor parameters? Describe them with examples.**[8]**

b) What are the different imaging sensor systems. Describe them. **[8]**

OR

Q10) a) Classify earth resource satellites. Describe any two series of satellites. **[8]**

b) Which are the different Meteorological satellites. Describe any two of them. **[8]**

Q11) a) Why is the need for integration of remote sensing and GIS? Explain the process of integration. **[10]**

b) Describe the software scenario in GIS focusing on functionalities, products and developers. **[8]**

OR

Q12) a) Explain the issues in integration of remote sensing with GIS. **[10]**

b) List and explain application areas of remote sensing and GIS. **[8]**

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P628   **[4064]-278**

B.E. (Information Technology)
SYSTEM OPERATIONS AND MAINTENANCE
(2003 Course) (414448) (Sem. - II)

Time : 3 Hours]   [*Max. Marks : 100*

Instructions to the candidates:

1) *Answers to the two sections should be written in separate sheet.*
2) *Use of logarithmic tables, slide rules and electronic pocket calculator is allowed.*
3) *Neat diagram must be drawn wherever necessary.*
4) *Figures to the right indicates full marks.*
5) *Assume suitable data, if necessary.*

SECTION - I

Q1) a) What is TMN? With neat diagram explain the function within TNM architecture. **[8]**

    b) List the basic principle of service and product creation. **[8]**

<div align="center">OR</div>

Q2) a) List the key function of the following support process. **[8]**

      i) Customer care and billing.

      ii) Order processing and provisioning.

    b) List the strategic benefits of advanced support system. **[8]**

Q3) a) What is the need of directory services? Explain various attributes of lightweight directory access protocols. **[8]**

    b) Explain telecommunication-oriented Management Protocols. **[8]**

<div align="center">OR</div>

Q4) a) Explain Local Number Portability and its advantages. **[8]**

    b) Explain Common Management Information Protocol. Write its strength and weaknesses. **[8]**

Q5) a) Write a short note on Customer Interface Management Process. **[8]**

b) What is IP Billing? Explain categories of rating scheme. **[10]**

OR

Q6) a) Explain the Problem Handling Process with different principal task.**[10]**

b) Write a note on
   i) Customer Relationship Management
   ii) Economics of billing **[8]**

SECTION - II

Q7) a) Explain the principle functions of Service configuration process. **[10]**

b) Write principle functions of 'Service Ordering Process'. Also identify the information sources to this process. **[8]**

OR

Q8) a) With neat diagram explain typical managed objects in Inventory management. **[8]**

b) What are the central features of workflow engine? Write important benefits of workflow applications. **[10]**

Q9) a) With different principle tasks explain Network planning and development process. **[8]**

b) Explain four principles involved when we perform migration from one billing system to another. Also explain three approaches to minimize the risks with this ultimate conversion. **[8]**

OR

Q10) a) Draw and explain TeMIP architecture from Compaq. **[8]**

b) Explain how service providers need multiple tools in combination to meet all the requirements in their SLAs signed with their customers with the providers. Give suitable example. **[8]**

Q11) a) List the consideration to be accounted for designing a website **[8]**

b) How service providers highlights gaps in business process, tools, standards, and human resource. Briefly explain gap analysis. **[8]**

OR

Q12) a) What is DMS? Write key benefits DMS offers to the service providers. **[8]**

b) The contract between the individual and the organization is often psychological while keeping the teams. Why? Also write sample of expectations from both side while keeping the network management team together. **[8]**

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P493   **[4064]-280 B**

B.E. (Information Technology)
REAL TIME SYSTEM
(Sem. - II) (2003 Course) (Elective - II) (410451)

Time : 3 Hours]   [*Max. Marks : 100*

Instructions to the candidates:

1) Answer any three questions from Section I and three questions from Section II.
2) Answer to the two sections should be written in separate books.
3) Neat diagrams must be drawn wherever necessary.
4) Figures to the right indicate full marks.
5) Electronic pocket calculator and is allowed.
6) Assume suitable data, if necessary.

SECTION - I

Q1) a) Describe the classification of Real Time System with suitable example. What are the issue in Real Time computing. **[8]**

b) Draw neat block diagram of Real-Time system (RTS) and explain its different components. **[8]**

OR

Q2) a) What is Performability? Explain with suitable example. In what way it is different then traditional measure of Performance. **[6]**

b) What are the various factor, that are to be consider while estimating the Program run time in RTS. Describe Analysis of source code example. Derive lower bounds and upper bound for suitable example. **[10]**

Q3) a) Explain in detail Rate-Monotonic Scheduling Algorithm. What is the necessary and sufficient condition for RM schedulability. Explain with suitable example. **[8]**

b) Write short note on (any two) **[10]**
   i) The buddy Strategy
   ii) MOS (Myopic Off line Scheduling) algorithm.
   iii) IRIS (Increase Reward Increase Service)

OR

Q4) a) Explain the preemptive Earliest Deadline algorithm with the help of suitable example. In what way preemptive-Earliest Deadline First algorithm (EDF) is different then Rate Monotonic scheduling algorithm (RM)? **[10]**

b) Write short note on. (any two)

   i) Focused Addressing and Bidding algorithm.

   ii) Fault tolerant scheduling algorithm.

   iii) Disk scheduling Algorithm. **[8]**

Q5) a) Differentiate Real Time Database and General purpose data base. **[4]**

b) Why are main memory database faster then disk based database for single processor. **[4]**

c) State the assumption made for the implementation of the Adaptive Earliest Deadline. By what method are the transaction assigned to the HIT/MISS groups? How are the transaction in HIT group and in MISS group scheduled. **[8]**

OR

Q6) a) What is optimistic concurrency control? Describe following policies related to the optimistic algorithm in the presence of transaction priorities.

   i) Scarifice policy

   ii) Wait policy **[8]**

b) Describe the priority inberitance protocol. Give an example to show how this protocol can lead to deadlock. **[8]**

SECTION - II

Q7) a) Explain virtual Time carrier sensed multiple access (VTCSMA) algorithm with flow chart. Draw the VC-RC trajectory for example $n = 2, n = 4$. **[10]**

b) Describe the stop and Go multihop protocol and comment on its performance. **[8]**

OR

Q8) a) Discuss the window protocol with suitable example. Discuss the performance of this algorithm. Where is the contention protocol most suitable. **[10]**

b) Describe the Timed Token protocol. Why this protocol is attractive for RTS. **[8]**

Q9) a) Explain in details capability of RT Linux along with API for time services.**[8]**

b) Describe which scheduling algorithm is used in RTLinux as against standard Linux. **[4]**

c) Explain in detail timer function support in RTLinux, where it is used.**[4]**

OR

Q10) a) Describe the following capability of real time operating system.

i) External- internal interrupt Handling.

ii) Memory management through virtual memory mapping and memory locking. **[8]**

b) Write short notes on. (any two)

i) Two level scheduler.

ii) VX works.

iii) KURT. **[8]**

Q11) a) Illustrate with the help of neat diagram the implementation of N-Modular Redundancy? **[8]**

b) Describe the following software redundancy method.

i) N- Version Programming

ii) Recovery Block approach **[8]**

OR

Q12) a) Describe the 3 - types of voters in cases where an approximate agreement is required to achive hardware redundancy through voting and consensus.**[8]**

b) Explain the Byzantine's algorithm for fault tolerance with an example. Algo specify the interactive consistency condition. **[8]**

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B.E. (Biotech.)

CHEMICAL REACTION ENGINEERING-II

(2003 Course) (Sem. - I) (409343)

Time : 3 Hours]   *[Max Marks : 100*

Instructions to candidates :

1)   *Answer any three questions from section I and any three questions from Section II.*
2)   *Figures to the right indicate full marks.*
3)   *Use of Programmable calculator is not allowed.*
4)   *Draw a neat sketch wherever necessary.*
5)   *Make necessary assumptions wherever required.*

SECTION-I

Q1) a)   Calculate the time required to burn to completion particles of graphite (R_0=5 mm. $\rho_B = 2.2$ gm/cc, k" = 20 cm/sec) in an 7% oxygen stream. Assume film diffusion doesn't offer any resistance to mass transfer and reaction. The reaction temperature =700 C.   **[8]**

   b)   A feed consisting of 30% of 50 μ m radius particles, 40% of 100 μ m radius, 30% of 200 μ m radius is to be fed continuously in a thin layer onto a moving grate crosscurrent to a flow of reactant gas. The time required for complete conversion is 5,10,20 min. for three sizes of particles. Determine the conversion of solids on the grate for a residence time of 8 min. in the reactor.   **[10]**

OR

Q2) a)   Explain various methods of contacting patterns in fluid-solid reactions.**[8]**

   b)   Particles of uniform size are 60% converted on the average when flowing through a single fluidized bed. If the reactor is made twice as large but contains same amount of solids and with the same gas environment. Determine the conversion of solids.   **[10]**

Q3) a)   Explain the significance of Hatta Number.   **[6]**

   b)   Derive the design equation for following contacting pattern in fluid-fluid reactions.   **[10]**

   i)   Plug flow gas/plug flow liquid-Mass transfer + reaction in countercurrent tower.

   ii) Plug flow gas/ Mixed flow liquid-Mass transfer + reaction in bubble tank contactors.

                                                                  P.T.O.

Q4) The concentration of undesirable impurity in air (1 bar) is to be reduced from 0.1% to 0.02% by absorption in pure water. Determine the height of tower required for countercurrent operations. **[16]**

Data: k_{Ag}=0.32 mol/hr.m³.pa

k_{Al}=0.1/hr.

H_A=12.5 Pa.m³/mol

Flow rates F_g/A_{cs}=1*10⁵ mol/hr.m²

F_l/A_{cs}=7*10⁵ mol/hr.m²

Total molar density of liquid= 56000 mol/m³.

Q5) a)   Explain the methods of determination of catalyst pore volume in detail.
[8]

b)   Write short notes on-   **[8]**
   i)   Catalyst deactivation.
   ii)   Catalyst activation.

OR

Q6) a)   Explain method of determination of catalyst surface area by BET method. **[8]**

b)   Explain mercury penetration method for determination of catalyst pore size. **[8]**

SECTION-II

Q7) Determine the size of packed bed reactor required to treat 2000 mol/hr of pure A at 117 C with initial concentration of 0.1 mol/lit. to 35% conversion all at 3.2 atm. **[16]**

A→4R.

Data:

C_A,mol/lit	0.039	0.0575	0.075	0.092
-r_A,mol/hr.kg	3.4	5.4	7.6	9.1

OR

Q8) a)   Explain the relationship between effectiveness factor and Thiele modulus for different catalyst particle shapes. **[8]**

b)   Explain mechanism of catalyst deactivation. **[8]**

Q9) The catalytic reaction A→4R. is run at 3.2 atm and 100 C in tubular reactor which contains 0.01 kg of catalyst and uses a feed consisting of partially converted product of 20 lit/hr of pure A and following data was recorded. Determine the rate equation for this reaction. **[16]**

$C_A$in, mol/lit	0.1	0.08	0.06	0.04
$C_A$out, mol/hr.kg	0.084	0.070	0.055	0.038

OR

Q10) a) Derive the expression for design equation for mixed flow and plug flow reactor containing porous catalyst **[8]**

b) Explain the role of diffusion resistance in pores for first order reaction and derive the expression for finding the yield of a product R in following series reaction. **[8]**

A→ R→S

Q11) Substrate A and enzyme E flow through a mixed flow reactor of volume 6 lit. Determine the rate equation to represent the action of enzyme on substrate. **[18]**

C_{Eo}, mol/lit	C_{Ao}, mol/lit	C_A, mol/lit	v, lit/hr
0.02	0.2	0.04	3.0
0.001	0.3	0.15	4.0
0.0001	0.69	0.60	1.2

OR

Q12) a) Write short note on- **[8]**

i) Bubble column reactor.

ii) Slurry reactor.

b) Explain design of staged adiabatic reactors with the design equations. **[10]**

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P496　　　　　　　　　**[4064]-283**

B.E. (Biotechnology)
BIO-PROCESS EQUIPMENT DESIGN
(2003 Course) (Sem. - I) (416283)

Time : 3 Hours]　　　　　　　　　　　　　　[*Max. Marks : 100*

Instructions to the candidates:

　　1)　*Answer any three questions from section I and any three questions from section II.*

　　2)　*Figures to the right indicate full marks.*

　　3)　*Use of programmable calculator is not allowed.*

　　4)　*Draw a neat sketch wherever is necessary.*

　　5)　*Make necessary assumptions wherever required.*

SECTION - I

Q1)　a)　Write a short note on:

　　　　i)　TFF system

　　　　ii)　Leaf filter　　　　　　　　　　　　　　　　　　**[10]**

　　b)　State the need of downstream processing in biological processes. Explain sublimation drying/lyophilization.　　　　　　　　**[8]**

OR

Q2)　a)　Explain the construction and working of centrifuge discharge filter. **[8]**

　　b)　Discuss about commissioning and validation of filter.　　　**[10]**

Q3)　a)　What are the different types of valves commonly used in process industries?　　　　　　　　　　　　　　　　　　**[8]**

　　b)　Describe downstream processing operation used in fermentation process.**[8]**

OR

Q4)　Write short note on :　　　　　　　　　　　　　　**[16]**

　　a)　Steam sterilization.

　　b)　Validation of filter.

Q5) a) Describe the design of plain head, shallow head, hemispherical head with neat sketches. **[8]**

b) Explain autofrettage and shrink fit construction of high pressure vessel.**[8]**

<div align="center">OR</div>

Q6) a) Design high pressure vessel using maximum shear stress theory from following data: **[8]**

Internal diameter of shell	-	20 cm
Internal pressure	-	140 N/mm^2
External pressure	-	atmospheric
Material	-	High tensile steel
Permissible tensile stress	-	478 N/mm^2
Modulus of Elasticity	-	2×10^5 N/ mm^2

b) A vessel is to be designed to withstand internal pressure of 150 MN/m^2. An internal diameter of 300 mm is specified and steel having a yield point of 450 MN/m^2 has been selected. Calculate the wall thickness required by various theories with a factor of safety 1.5 and $\mu = 0.3$. **[8]**

<div align="center">

SECTION - II

</div>

Q7) a) Describe with neat sketch design of spiral heat exchanger. **[6]**

b) Discuss the fouling of plate heat exchanger. **[6]**

c) Discuss the advantages and disadvantages of plate and frame heat exchanger over shell and tube heat exchanger. **[6]**

<div align="center">OR</div>

Q8) Ammonia vapours are to be condensed at 1500 kN/m^2. Saturation temperature of ammonia vapours is 42°C, flow rate of vapours = 0.3kg/sec. Water is available at 28°C.

25 mm OD tubes are arranged on triangular pitch of 31 mm and 5 m in length are available.

Overall heat transfer coefficient for condensing ammonia vapours =1000-2500 w/m^2. K.

Properties of liquid ammonia: Density = 600 kg/m^3, viscosity = 0.085×10^{-3} N.s/m^2,

Thermal conductivity = 0.502 w/m.k,

Fouling factor on ammonia side = 0.0002 m^2k/w

Fouling factor on water side = 0.0004 m^2k/w

Latent heat of ammonia vapours = 1092 kJ/kg

Design 1:4 type shell and tube heat exchanger.

Density of water = 1000kg/m^3, viscosity = 0.7×10^{-3} N.s/m^2,

Thermal conductivity of water = 0.63 w/m.K. **[18]**

Q9) a) Explain shaft design based on critical speed. **[6]**

b) Explain various types of jackets with neat sketches. **[10]**

OR

Q10) a) Explain shaft design based on Torque and bending moment. **[6]**

b) Design shaft and blade of turbine agitator which is running in vessel of 1800 mm diameter using critical speed criteria.

Internal pressure vessel - 0.35 N/mm^2, Diameter of agitator - 200 mm, Speed (Max) - 400 rpm, Liquid in vessel specific gravity - 1018, Viscosity - 450cP,

Overhang of agitator shaft between bearing and agitator - 1000 mm,

Agitator blade nos. -6, Width of blade - 65 mm, Thickness of blade - 8 mm, Shaft material - rolled stel permissible stress - 55 N/mm^2, Tensile stress - 310 N/mm^2, E - 19.8 N/mm^2. **[10]**

Q11) a) Explain design of plate column with downcomer. **[8]**

b) Explain design of liquid distributors and restributors. **[8]**

OR

Q12) a) Explain the optimum sieve plate performance diagram. **[6]**

b) Discuss various fed arrangements to be considered for distillation column along with neat sketches. **[8]**

c) Define percent flooding and weep point. **[2]**

■■■

P612   **[4064]-31**

B.E. (Mechanical and Mechanical S/W) (Common)
CAD/CAM AND AUTOMATION
(2003 Course) (Sem. - II) (402047)

Time : 3 Hours]   [*Max. Marks : 100*

Instructions to the candidates:

1) *Answer any three questions from each Section.*
2) *Answers to the two sections should be written in separate books.*
3) *Figures to the right indicate full marks.*
4) *Use of electronic calculator is allowed.*
5) *Assume suitable data, if necessary.*

SECTION - I

Q1) a) A rectangle ABCD has vertices A(1, 1), B(2, 1),C(2, 3) and D(1,3).It has to be scaled by 1.5 in x-direction and 2.0 in y-direction about point P(2,2). Determine: **[8]**

    i)   The composite transformation matrix.

    ii)   The new coordinates of rectangle.

  b) What is meant by geometric transformation? What is the need for it? What is its role in model construction and viewing?   **[8]**

<center>OR</center>

Q2) a) Show that: **[6]**

    i)   Mirror and 2D rotation about Z axis are not commutative.

    ii)   Scaling and 2D rotation about Z axis are commutative.

  b) Write a short note on transformation matrix for perspective projections.**[5]**

  c) Determine the concatenated transformation matrix for rotating any entity about any given point.   **[5]**

Q3) a) Explain the effect of the Multiple Control Points and Degree of B-spline Curve on its shape.   **[8]**

  b) Write a short note on "Order of continuity".   **[4]**

  c) Explain different solid manipulations and its importance.   **[4]**

<center>OR</center>

Q4) a) Distinguish between analytic and synthetic curve. **[6]**

b) Explain following curve manipulation features: **[6]**
   i) Evaluating Points on Curve
   ii) Segmentation

c) Write a short note on Parametric Solid Modeling. **[4]**

Q5) a) Explain, with suitable examples, the plane stress and plane strain condition. **[4]**

b) What is the significance of shape functions? Explain shape function in terms of natural coordinates, for the three noded 1-D elements. **[4]**

c) In the figure below, a load P = 60 kN is applied as shown. Determine the displacement field, stress and support reaction in the body. Take A = 250 mm² and E = 20 kN/mm². **[10]**
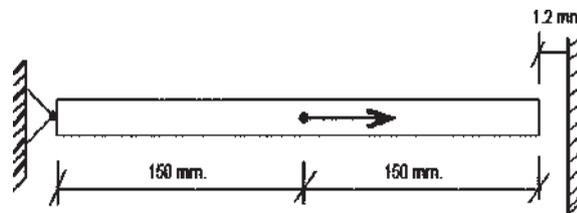
OR

Q6) a) For the two dimensional truss structure shown in figure determine the nodal deflections, stress in elements . Element (1) and (2) has a length of 1 m. Each element has a cross sectional area of 100 mm² and modulus of elasticity 210 GPa. Ignore the possibility of buckling of the member in compression. **[10]**
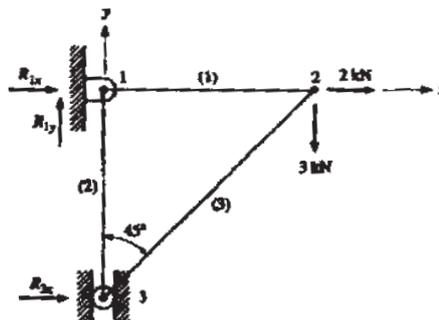
b) Write a short note on Automatic and Semi-automatic mesh generation with an illustrative example. **[8]**

SECTION - II

Q7) a) A CST element is defined by nodes at I (30, 40), J (140, 70), and K (80, 140) and the displacements at these nodes are (0.1, 0.5), (0.6, 0.5) and (0.4, 0.3) respectively.

Determine the displacement, the natural coordinates and the shape function at point P (77, 96) within the element. **[8]**

b) Explain shape function of CST element. Also explain the physical representation by area coordinates. **[8]**

OR

Q8) a) Discuss the Problem Modeling and Boundary Conditions for the following cases: **[8]**

i) A cylinder of infinite length subjected to external pressure.

ii) Belleville spring.

b) Explain how symmetry is used in FEA with applications. **[8]**

Q9) a) What do you understand by machine zero and job zero? Explain the significance of using job zero method. **[8]**

b) Write a manual part program for finishing a forged component as shown in the figure.

Assume the speed and feed on the turning centre as 500 rpm and 0.4 mm/ rev. assume 1 mm material is to be removed from external diameter.**[8]**

<center>OR</center>
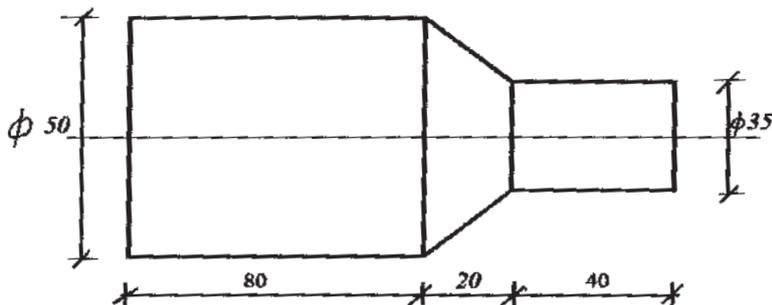
Q10) a) Write a note on new trends developing in CNC / DNC technology. **[6]**

b) Write a manual part program for component as shown in the figure. The size of the raw material is $\phi 37 \times 115$. Assume suitable machining data.**[10]**
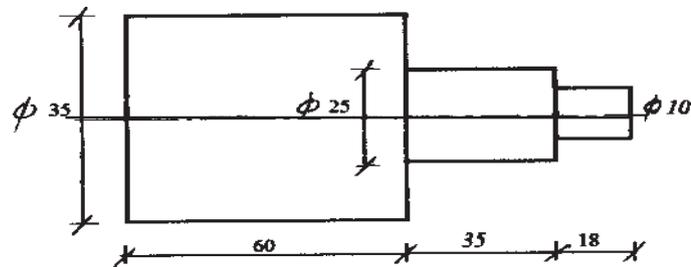
Q11) a) Write a short note on Magnetic Grippers used for robot. **[6]**

b) Sketch and explain the work envelope for various configuration of a robot? **[6]**

c) What are the Advantages and Limitations of Automation? **[6]**

<center>OR</center>

Q12) a) What are different types of joints used in Robot? **[6]**

b) What are the elements of FMS? **[6]**

c) What is machining centre? What are its advantages? **[6]**

<center>■■■</center>

P422   **[4064]-33**

B.E. (Mechanical)
INDUSTRIAL FLUID POWER
(2003 Course) (402049) (Sem. - II)

Time : 3 Hours]   [*Max. Marks : 100*

Instructions to the candidates:

1) *Answer Q. 1 or Q. 2, Q. 3 or Q. 4, Q. 5 or Q. 6, questions from Section I and Q. 7 or Q. 8, Q. 9 or Q. 10, Q.11 or Q. 12 questions from Section II.*
2) *Answers to the two sections should be written in separate books.*
3) *Neat diagrams must be drawn wherever necessary.*
4) *Figures to the right indicate full marks.*
5) *Use of electronic pocket calculator is allowed.*
6) *Assume suitable data, if necessary.*

SECTION - I

Q1) a) Explain in brief different applications of fluid power systems.   **[4]**

   b) List various types of hydraulic fluids. Discuss petroleum based fluids and fire resistant fluids.   **[6]**

   c) Define ratings of filter and strainer. Determine the Beta ratio of filter when, during test operations 30,000 particles greater than 20 micron enter the filter and 1150 of these pass through the filter. What is the Beta efficiency in this case?   **[6]**

OR

Q2) a) What criteria should be considered for selection of oils for a given hydraulic system?   **[5]**

   b) What is the difference between a static and a dynamic seal. Name four types of materials used for seal.   **[5]**

   c) Explain the types of reservoir assembly.   **[3]**

   d) Compare hose connections with pipe connections in brief.   **[3]**

Q3) a) Draw the neat sketch and explain the working of a typical variable delivery vane pump.   **[10]**

   b) State the important factors for selection of a pump for hydraulic power application.   **[6]**

P.T.O.

Q4) a) Explain the working of axial plunger pumps used in hydraulic system with its characteristics. **[10]**

b) Enlist applications of accumulators in hydraulic circuits Draw hydraulic circuit for any two applications of accumulators. **[6]**

Q5) a) Explain the importance of various center positions of a directional control valve and enlist advantages and disadvantages of each center position. **[8]**

b) What is the purpose of providing pilot operated check valve in hydraulic circuit. Explain in short a typical application of pilot operated check valve with circuit diagram. **[6]**

c) Compare pressure relief valve and unloading valve. **[4]**

OR

Q6) Write note on any three. **[18]**

a) 4 way 2 position lever operated directional control valve.

b) Counter balance valve

c) Pressure compensated flow control valve

d) Pressure reducing valve

SECTION - II

Q7) a) What is the purpose of providing cushioning in cylinder? With the help of neat sketch explain how it is achieved. **[8]**

b) A hydraulic transmission system operating at 70 bar has the following characteristics

Pump	Motor
$V_d = 82$ cm³	$V_d = ?$
$\eta_v = 82\%$	$\eta_V = 92\%$
$\eta_m = 88\%$	$\eta_m = 90\%$
$N = 500$ rpm	$N = 400$ rpm

Find: Displacement of motor and motor output torque. **[8]**

Q8) a) What factors will you consider in selecting a hydraulic motor? Mention two applications of hydraulic motor with their types. **[8]**

b) Explain the advantage of using two pumps for a press application instead of using a single pump. Give a suitable example and draw circuit diagram for dual pump hydraulic system. **[8]**

Q9) a) What is the purpose of providing filter, lubricator, muffler and driers in pneumatic systems? Draw symbol of each. **[8]**

b) Draw net sketch of a typical 3 way 2 position directional control valve used in pneumatic control circuit. Explain its working in short. **[5]**

c) What are the advantages of pneumatic systems over hydraulics systems?**[3]**

OR

Q10) a) What is 'shuttle valve and' 'two pressure valve'? Draw circuits using these valves. **[6]**

b) Explain with circuit diagram speed regulation methods used in pneumatic system. **[6]**

c) Explain working of typical air motor. **[4]**

Q11) a) A double acting cylinder is actuated by the circuit shown in Fig 11(a). The diagram shows the cylinder in mid stroke extending position. Note the operation of roller and limit switch by the cam provided on piston rod. The circuit also incorporate the arrangement to unload the pump (at the end of retraction) by venting the relief valve to tank via check valve E and C. Push button is used to energize the solenoid while limit switch operates to de-energize the same. Analyze the circuit and draw circuit views for mid stroke retracting and automatic stop of cylinder (at the end of cycle). **[8]**

b) A double acting pneumatic cylinder with a 80 mm bore, 25 mm rod, and a 100 mm stroke length must cycle (extend and retract) 40 times per minute. The supply pressure is 700 kPa gauge. What is the air consumption of the cylinder in standard m^3/min. Assume atmospheric pressure is 101 kPa. **[10]**

Q12) a) Study the pneumatic circuit shown in Fig (12a). Explain the operation of various components during one complete cycle. **[8]**

b) A cylinder with a bore diameter 63 mm and rod diameter 25 mm is to be used in system with a 45 Lit/min pump. Maximum load during normal extension stroke is 55 kN. What are the extension speeds when regenerating and not regenerating? Also calculate maximum working pressure required for this circuit and mention setting of pressure relief valve. **[10]**

Fig 11(a)

Fig (12a).

■ ■ ■
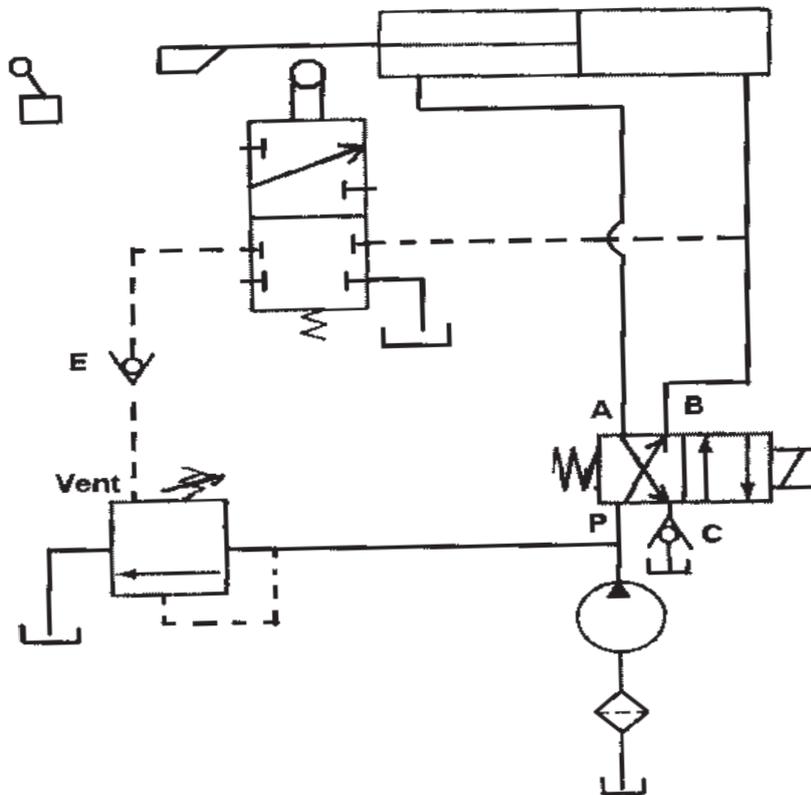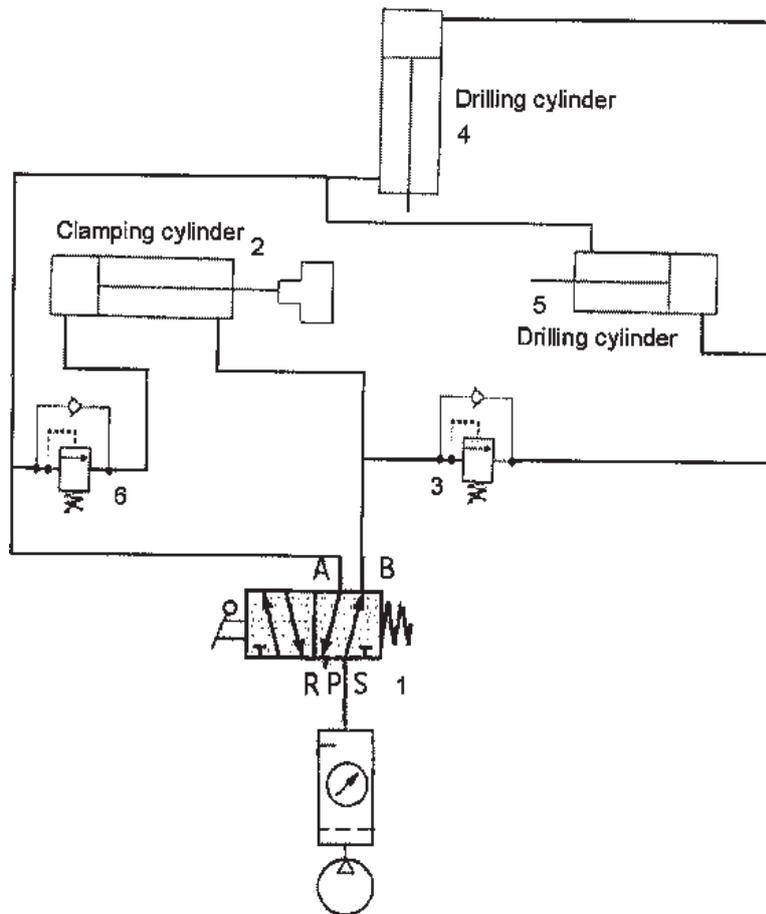
P425   **[4064]-38**

B.E. (Mechanical Engg.)
RELIABILITY ENGINEERING
(2003 Course) (402050) (Elective - II) (Sem. - II)

Time : 3 Hours]   [*Max. Marks : 100*

Instructions to the candidates:

1) *Answer any three questions from each Section.*
2) *Answers to the two sections should be written in separate books.*
3) *Neat diagrams must be drawn wherever necessary.*
4) *figures to the right indicate full marks.*
5) *Use of logarithmic tables slide rule mollier charts, electronic pocket calculator and steam tables is allowed.*
6) *Assume suitable data, if necessary.*

SECTION - I

Q1) a) A series of tests are conducted on 850 components and the total duration of tests is 12 Hrs. The no. of components failed during each hourly interval is noted and given in table. Find :   **[10]**
   i)   Failure density
   ii)   Hazard rate
   iii) Reliability

Time(t) Hr.	1	2	3	4	5	6	7	8	9	10	11	12
No. of failures	120	85	71	62	53	50	52	42	38	40	45	102

   b) Explain Availability & Maintainability. Also state the types of availability.**[6]**

Q2) a) In an engineering manufacturing plant 70% of crankshafts are ground by machinist R & 30% by machinist S. From past experience it has been observed that crankshafts ground by machinist R & S contains 6% and 4% defective. Find the probability that it was ground by the machinist R.**[10]**

   b) Explain center limit theorem.   **[6]**

Q3) a) Calculate the reliability of the system shown in Fig 1. The values in the Block show reliability of individual components in the system. **[10]**

Fig. 1
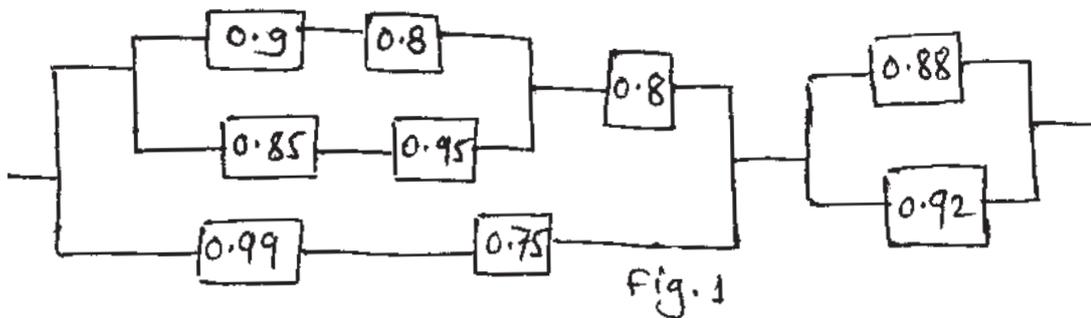
b) Eight components are connected in parallel to achieve the system reliability of 0.94. Determine the reliability of each component. How many additional number of components to be added in parallel to increase the reliability upto 0.96. **[6]**

Q4) a) Calculate the system reliability for the following fig.2 **[10]**

Fig. 2
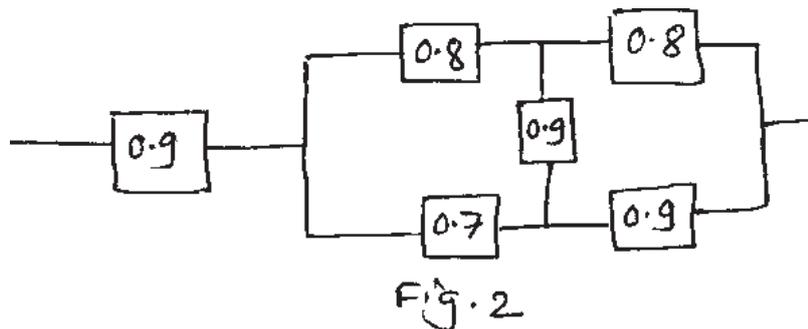
b) In a life test of 20 samples, following data is collected for the failure of component in hours. Determine the mean time to failure and reliability at 1300 Hrs.
840, 861, 905, 960, 975, 1020, 1060, 1120, 1150, 1200, 1215, 1235, 1260, 1280, 1300, 1315, 1340, 1365, 1375, 1400. **[6]**

Q5) Write short note on following (any three). **[18]**
   a) Baye's theorem and its applications.
   b) Probability Distributions.
   c) AGREE Method of Reliability Allocation.
   d) Total probability theorem .
   e) Types of redundancies.

Q6) a) The mean strength and the standard deviation of a bolted joint are 3000 kg/cm² and 260 kg/cm² respectively. The joint is loaded such that stress induced has a mean value of 2500 kg/cm² with a standard deviation of 40 kg/cm². Assuming that shear strength and the induced stresses are independent and normally distributed, find out the probability of survival of the bolted joint. Extract of data from statistical table is given below.

Z	1.2	1.3	1.4	1.5	1.6	1.7	1.8
Ø (z)	0.8849	0.9032	0.9192	0.9330	0.9450	0.9550	0.9630

[8]

b) Explain different types of loads considered in designing different machines. **[8]**

Q7) a) The following data refer to predicted reliability of six components in series. In case the desired reliability of the system is not to fall below 0.80, find the reliability goal for individual components.

component	1	2	3	4	5	6
Predicted reliability	0.99	0.90	0.995	0.95	0.95	0.98

[8]

b) Explain the magnified loading and sudden death testing for a system. **[8]**

Q8) a) A logic gate diagram for FTA study has been shown in Fig.1. The failure probabilities of 'a', 'b', 'c', 'd', and 'e' are 0.01, 0.003, 0.005, 0.007 and 0.09 resp. Find the system reliability. **[8]**
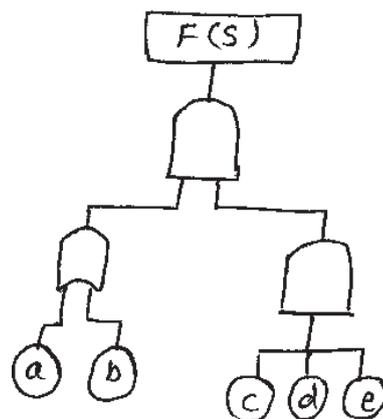
Fig. No. 1

b) Explain the systematic procedure to be followed for Failure modes, Effects and criticality analysis. **[8]**

Q9) a) In a short sample Accelerated life Testing of a system, based on weibull distribution the following data is recorded.

Failure No.	1	2	3	4	5	6	7	8	9
MTTF (Hrs.)	24	22	12	28	35	38	30	19	25

[8]

b) Explain the various accelerated life test carried out for reliability analysis. **[8]**

Q10) Write short note on following (any three). **[18]**

　　a) Bath Tab Curve.

　　b) Reliability Testing.

　　c) Fault Tree Analysis.

　　d) Quality and Safety.

　　e) Tie set and Cut set.

■ ■ ■

P632   **[4064]-444**

B.E. (Production)
SIMULATION AND MODELING
(2008 Course) (Elective - II) (411085 (C)) (Sem. - I)

Time : 3 Hours]   [*Max. Marks : 100*

Instructions to the candidates:

1)   Answer any three questions from each section.
2)   Answer to the two sections should be written in separate books.
3)   Neat diagram must be drawn wherever necessary.
4)   Figures to the right indicate full marks.
5)   Assume suitable data, if necessary.

SECTION - I

Q1) a) Explain with the aid of flow diagram various steps involve in simulation study. **[8]**

b) Explain the concept of system in simulation study with the help of example.**[8]**

OR

a) Explain various areas of applications of simulation. **[8]**

b) Write event and activities are associated with the operation of your cheque book? **[8]**

Q2) a) Explain with illustrative example the simulation of single queuing system.**[8]**

b) One company uses 6 trucks to haul iron ore from location "A" to industry. There are two loaders to load truck. After loading a truck moves to the weighing scale to be weighed. The queue discipline is FIFO. When it is weighed a truck travel to the industry and returns to the loader queue. The distributions of loading time, weighing time and travel time are as follows:

Loading times-	10	5	5	10	15	10	10
Weigh times-	12	12	12	16	12	18
Travel times-	60	100	40	40	80

Calculate the total busy time of both loader. Of the scale average loader and scale utilization. Assume 5 trucks are at the loader and one is at the scale at time "0" stopping time TE=64 min. **[10]**

P.T.O.

OR

a) A small shop has one checkout counter. Customer arrives at this counter at random from 1 to 10 minute apart. Each possible value of inter arrival time has the same probability of occurrence equal to 0.10. The service times vary from 1 to 6 minutes with probability shown below. **[10]**

Service time: 1 2 3 4 5 6
Probability: 0.05 0.10 0.20 0.30 0.25 0.10

Develop simulation table for 10 customers. Find
i) Average waiting time
ii) Average service time
iii) Average time customer spends in the system.

Take random digits for arrival as 91, 72, 15, 94, 30, 92, 75, 23, 30 and for service times are 84, 10, 74, 53, 17, 79, 91, 67, 89, 38 sequentially.

b) Explain with illustrative example the simulation of inventory system.**[8]**

Q3) a) Enlist the steps involve in development of useful model of input data.**[8]**

b) Explain the linear congruential method for generating random numbers and generate three random numbers using above method with X0 = 27, a = 17 c = 43 and m = 100. **[8]**

OR

a) Explain the various testes used for testing random numbers for their desirable properties. **[8]**

b) Define random number. Explain statistical properties of random numbers with example. **[8]**

SECTION - II

Q4) a) Explain type of simulation with respect to output analysis. Give atleast two example. **[8]**

b) What is output analysis? State its purpose. Explain point estimation and interval estimation. **[8]**

OR

a) Explain chi-square goodness of fit test to accept or reject a candidate distribution. **[8]**

b) With illustrative example describe the output analysis for steady state simulations. **[8]**

Q5) a) Discuss how the performance of simulated system is measured and estimated with suitable example. **[8]**

b) Discuss about a simulation of a manufacturing shop. **[8]**

OR

a) What are Input parameters to be consider in automated material handling systems. **[8]**

b) Discuss about a simulation of a flexible manufacturing systems. **[8]**

Q6) a) Explain in detail desirable features of simulation software. **[10]**

b) Enlist various simulation software used in simulation of discrete system manufacturing with its important features. **[8]**

OR

Write a short note: **[18]**

i) Advantages and Disadvantages of simulation.

ii) Simulation and Analytical methods.

iii) Discrete event simulation.

■■■

P 565   **[4064] - 446**

B.E. (Prod. S/W)

OPERATIONS RESEARCH & MANAGEMENT

(Sem. - I) (2008 Course) (411121)

Time : 3 Hours]   *[Max Marks : 100*

Instructions to candidates :

   1)   Answer any 3 questions from each section.
   2)   Answer 3 questions from Section I and 3 questions from Section II.
   3)   Answers to the two sections should be written in separate books.
   4)   Neat Diagrams must be drawn wherever necessary.
   5)   Figures to the right indicate full marks.
   6)   Your are advised to attempt not more than 3 questions.
   7)   Use of logarithmic tables silde rule, Mollier charts, electronic pocket calculator and steam tables is allowed.
   8)   Assume suitable data, if necessary.

SECTION-I

Q1) a)   Explain the terms: key decision, objective, alternatives and restrictions in the context of linear optimization models.   **[6]**
         forms.

      b)   Use the two-Phase simplex method to :   **[10]**
         Minimize $Z = 2x_1 + x_2$
         Subject to $5x_1 + 10x_2 - x_3 = 8$
                        $x_1 + x_2 + x_4 = 1$
                        $x_1, x_2, x_3, x_4, \ all \geq 0$

                        OR

Q2) a)   Write the dual of the following primal.   **[4]**
                        $Z = 3x_1 - 2x_2 + 4x_3,$
         Minimize

                        $3x_1 + 5x_2 + 4x_3 \geq 7,$
                        $6x_1 + x_2 + 3x_3 \geq 4,$
                        $7x_1 - 2x_2 - x_3 \leq 10,$
         Subject to $x_1 - 2x + 5x_3 \geq 3,$
                        $4x_1 + 7x_2 - 2x_3 \geq 2,$
                        $x_1, x_2, x_3 \geq 0.$

b) A pharmaceutical company produces two popular drugs A and B which are sold at the rate of Rs. 9.60 and Rs. 7.80 respectively. The main ingredients are x, y, and z and they are required in the following proportions: **[12]**

Drugs↓	x%	y%	z%
A	50	30	20
B	30	30	40

The total available quantities (gms) of different ingredients are 1600 in x, 1400 in y, and 1200 in z. The cost in Rs. of x, y, and z per gm are Rs. 8, Rs. 6 and Rs. 4 respectively. Estimate the most profitable quantities of A and B to be produced using simplex method.

Q3) a) Explain the similarities and differences between the transportation and transshipment problem. **[6]**

b) Find the initial basic feasible solution to the following transportation problem by : **[12]**
i) minimum cost method.
ii) North west corner rule. State which of the method is better.

	To			**Supply**
From	2	7	4	5
	3	3	1	8
	5	4	7	7
	1	6	2	14
Demand	7	9	18	

OR

Q4) a) State the common and distinguishing features of assignment model and write its applications. **[6]**

b) Consider the problem of assigning five operators to five machines. The assignment costs are given below. **[12]**

		Operators				
		I	II	III	IV	V
	A	10	5	13	15	16
	B	3	9	18	3	6
Machines	C	10	7	2	2	2
	D	5	11	9	7	12
	E	7	9	10	4	12

Assign the operators to different machines so that total cost is minimized.

Q5) a) What are the various assumptions made while dealing with sequencing problems? **[6]**

b) There are four jobs each of which has to be processed on machines A,B,C,D,E and F in the order A B C D E F. Processing time in hours is given in table below. Find out the optimal sequencing of jobs, minimum time required to process these jobs and the idle time for each of the machines. **[10]**

Jobs	A	B	C	D	E	F
1	15	8	6	14	6	26
2	17	7	9	10	15	22
3	21	7	12	9	11	19
4	18	6	11	12	14	17

OR

Q6) a) Derive an expression for optimal lot size and minimum average cost per unit time for demand rate uniform and production rate infinite. **[8]**

b) Solve the following sequencing problem giving an optimal solution when no passing is allowed **[8]**

Job

		1	2	3	4	5
Machine	A	14	7	12	8	10
	B	5	6	4	7	3
	C	3	2	4	1	5
	D	10	12	8	15	16

SECTION-II

Q7) a) A branch of Punjab National bank only one typist. Since the typist work varies in length (Number of pages to be typed), the typing rate is randomly distributed approximating a Poisson distribution with mean service rate of 8 letters per hour. The letters arrive at rate of 5 per hour during the entire 8 hour work day. If the typewriter is valued at Rs. 1.5 per hour, Determine: **[8]**

i) Equipment utilization;

ii) The percent time that an arrival letter has to wait.

iii) Average system time;

iv) Average cost due to waiting on the part of typewriter.

b) Explain the following Terms in "Games Theory": **[8]**

    i) Saddle Point;

    ii) Maximin and minimax principle;

    iii) Value of the Game;

    iv) Two person zero sum game.

<div align="center">OR</div>

Q8) a) A person repairing radios finds that the time spent on the radio sets has been exponential distribution with mean 20 minutes. If the radios are repaired in the order in which they come in and their arrival is approximately poisson with an average rate of 15 for 8 hour day, what is the repairman's expected idle time each day? How many jobs are ahead of the average set just brought in? **[8]**

b) Consider the Game having the following Pay Off: **[8]**

<div align="center">Player B</div>

		B1	B2
	A1	2	6
PlayerA			
	A2	−2	λ

    i) Show that whatever the value of "λ" may be, the game is strictly deterministic.

    ii) Solve the Game.

Q9) a) A system contains 10,000 resistors. When any resistor fails, it is replaced. The cost of replacing a resistor individually is Rs. 1, If all the resistors are replaced at a same time, the cost per resistor is reduced to 35 paise. The per cent surviving at the end of month are given below: **[8]**

End of the month	0	1	2	3	4	5	6
Probability of failure during that month	0	0.04	0.06	0.25	0.30	0.15	0.20

What is the optimum replacement plan?

b) What is Monte Carlo method of simulation? What are advantages and limitations of simulation technique? **[8]**

Q10) a) Describe the following replacement policies: **[8]**

   i) For items when money value remains constant:

   ii) For items when money value changes with constant rate during the Period.

b) A fleet owner finds from his past records that the costs per year of running a truck whose purchase price is Rs. 6000 are as given bellow:

[8]

Year	1	2	3	4	5	6	7
Running cost (in Rs)	1000	1200	1400	1800	2300	2800	3400
Resale value (in Rs)	3000	1500	750	375	200	200	200

Determine at what age is the replacement due.

Q11) a) The following table lists the jobs of a network along with their time estimates: **[10]**

Job i-j	To	tm	tp
1-2	3	6	15
1-6	2	5	14
2-3	6	12	30
2-4	2	5	8
3-5	5	11	17
4-5	3	6	15
5-8	1	4	7
6-7	3	9	27
7-8	4	19	28

   i) Draw the project network?

   ii) Calculate the length and variance of the critical path?

   iii) What is the probability that the jobs on the critical path will be completed in 40 days?

   iv) What is the probability that the jobs on the next most critical path will be completed by the due date of 33 days?

Z	0.4	0.5	0.6	0.7	0.8	0.9	–
Prob.	0.65	0.69	0.72	0.75	0.78	0.81	–

b) Define the following. **[8]**
   i)   Total float.   ii) Free float.
   iii) Independent float   iv) Earliest time.
   v)   Latest time.   vi) Slack.

<div align="center">OR</div>

Q12) a) Differentiate between CPM & PERT. What critical path means in project management? **[6]**

b) For the data tabulated below draw the network. Crash symmetrically the activities and determine the optimal project duration and cost:

[12]

Activity	Normal		Crash	
	Time (days)	Cost Rs.	Time (days)	Cost Rs.
1-2	8	100	6	200
1-3	4	150	2	350
2-4	2	50	1	90
2-5	10	100	5	400
3-4	5	100	1	200
4-5	3	50	1	100

Indirect cost is Rs. 70 per day.

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B.E. (Production S/W)
AUTOMOBILE ENGINEERING
(2008 Course) (Sem. - I) (Elective - I) (411124(B))

Time : 3 Hours]   *[Max Marks : 100*

Instructions to the candidates :

1)   *Answers to the two sections should be written in separate books.*

2)   *Neat Diagram must be drawn wherever necessary.*

3)   *Figures to the right indicate full marks.*

4)   *Assume suitable data if necessary.*

5)   *All questions are compulsory.*

SECTION-I

UNIT-I

Q1) a)   List various types of frame and describe in brief the conventional frame.   **[8]**

b)   Describe the working of two stroke petrol engine with neat diagrams. **[8]**

c)   Define automobile engineering.   **[2]**

OR

Q2) a)   Classify the vehicles on the basis of different aspects.   **[8]**

b)   Describe the working of four stroke petrol engine with neat diagram.
                                                                          [8]

c)   What do you mean by Articulated vehicle?   **[2]**

UNIT-II

Q3) a)   What is the purpose of a radiator in an automobile? Explain its construction.   **[6]**

b)   What is the optimum cooling? Explain.   **[6]**

c)   What are open and close cooling systems?   **[4]**

OR

P.T.O.

Q4) a) Explain water cooling system with the help of diagram. **[8]**

b) What is the effect of inadequate cooling and overheating of engine parts? **[8]**

UNIT-III

Q5) a) What are the functions of the lubrication system in an automobile? **[6]**

b) What is mean by viscosity rating? **[3]**

c) Explain Battery ignition system. **[7]**

OR

Q6) a) Explain in brief wet sump lubrication. **[8]**

b) What are the requirements of good ignition system? **[8]**

SECTION-II

UNIT-IV

Q7) a) What is hydraulic clutch? How dose it work? **[7]**

b) Explain the operation of an epicyclic gear box. **[8]**

c) Why is clutch pedal "free play" important? **[3]**

OR

Q8) a) With the help of neat sketch, explain the construction and operation of sliding mesh gear box. **[12]**

b) What is the purpose of clutch? **[6]**

UNIT-V

Q9) a) What is the function of suspension system? **[6]**

b) Sketch and explain Ackermann steering mechanism. **[10]**

OR

Q10) a)   Write short note on self levelling suspensions.   **[8]**

b)   What are the components of the steering system?   **[8]**

UNIT-VI

Q11) a)   Describe in brief the construction and working of drum brakes. **[10]**

b)   Why disc brakes are better than drum type brakes?   **[6]**

OR

Q12) a)   Write the advantages and disadvantages of hydraulic brakes.   **[8]**

b)   Explain different types of maintenances with example.   **[8]**

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P 636   **[4064] - 462**

B.E. (Electrical)

POWER SYSTEM OPERATION AND CONTROL

(2008 Course) (Sem. - I) (403142)

Time : 3 Hours]   *[Max Marks : 100*

Instructions to candidates :

   1)   Answer any three questions from each section.

   2)   Answers to the two sections should be written in separate books.

   3)   Neat diagrams must be drawn wherever necessary.

   4)   Figures to the right indicate full marks.

   5)   Use of electronic pocket calculator is allowed.

   6)   Assume suitable data, if necessary.

SECTION-I

Q1) a)   Explain equal area criterion of stability for sudden increase in mechanical input to generator.   **[9]**

   b)   Explain the point by point method for solution of swing equation.   **[9]**

OR

Q2) a)   Explain the equal area criterion of stability for sudden short circuit on one of the parallel lines away from line ends [in the middle of a line]. Derive the expression for critical clearing angle.   **[10]**

   b)   A generator delivers 1.0 p.u. power to an infinite bus through a transmission line network. A three phase short circuit fault takes place at the centre of the line. This reduces maximum power transferable to 0.45 p.u. whereas before the fault, this power was 2.2 p.u. and after clearance of fault, it is 1.8 p.u. By the use of equal area criterion, determine the critical clearing angle. Neglect resistance.   **[4]**

   c)   Explain methods to improve stability of a power system.   **[4]**

Q3) a)   Draw a loading capability curve of a synchronous generator and explain reactive power generation and absorption.   **[10]**

   b)   Write a note on effect of excitation and excitation control.   **[6]**

OR

Q4) a) Explain the series compensation for transmission lines. What are the advantages of providing series compensation? Also explain problems associated with series compensation. **[8]**

b) Write a note on synchronous condenser. Compare synchronous condenser with static capacitors used for reactive power support. **[8]**

Q5) a) Write brief note on Static VAr Compensators (SVCs). **[8]**

b) Explain the principle of operation of Thyristor Controlled Series Capacitors (TCSC) with its advantages. **[8]**

OR

Q6) a) Explain the principle of working of Static Compensator (STATCOM). State the advantages and applications of STATCOM. **[8]**

b) Explain Unified Power Flow Controller (UPFC) with diagram. **[8]**

SECTION-II

Q7) a) What is the necessity of automatic generation control. Explain with block diagram the working of proportional plus integral load frequency controller for an isolated power system. **[8]**

b) Write short note on: **[8]**
   i) Speed governor dead band.
   ii) Generator rate constraint.

OR

Q8) a) With neat block diagram explain two area load frequency control. Also explain the concept of Area Control Error (ACE). **[10]**

b) Explain the dynamic change in frequency as a function of time for a step change in load in case of single area case. **[6]**

Q9) a) Write short note on following concepts with reference to Unit Commitment: **[10]**
   i) Spinning reserve.
   ii) Minimum up time, Minimum down time.
   iii) Fuel constraint.
   iv) Must run.
   v) Hydro constraint.

b) State various methods of unit commitment and explain 'priority list method' of unit commitment with example. **[8]**

Q10) a) Explain the heat rate curve and cost curve of a thermal generating unit. **[4]**

b) Explain with mathematical formulation, the economic load dispatch without transmission loss and including equality constraint of meeting load. **[8]**

c) The fuel cost function for three thermal plants in $/hr are given as follows. **[6]**

$$C1 = 500 + 5.3P1 + 0.004\ P1^2$$
$$C2 = 400 + 5.5P2 + 0.006\ P2^2$$
$$C3 = 200 + 5.8P3 + 0.009\ P3^2$$

Total load to be served is 800 MW. Neglecting transmission losses and generator limits, calculate the optimum contribution of all generators analytically. Also calculate total cost in $/hr.

Q11) Explain following terms: **[16]**

a) Energy banking.

b) Capacity interchange.

c) Diversity interchange.

d) Emergency power interchange.

e) Inadvertent power exchange.

OR

Q12) Explain: **[16]**

a) Power Pools.

b) Interchange evaluation with unit commitment.

c) Multi utility Interchange transactions.

d) Inter utility economy energy evaluation.

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P 567   **[4064] - 463**

B.E. (Electrical)
ROBOTICS & AUTOMATION
(2008 Course) (403143(A)) (Sem. - I) (Elective - I)

Time : 3 Hours]   *[Max Marks : 100*

Instructions to candidates :

1)   Answers to the two sections should be written in separate books.
2)   Neat Diagrams must be drawn wherever necessary.
3)   Figures to the right indicate full marks.
4)   Use of logarithmic tables slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.
5)   Assume suitable data, if necessary.

SECTION-I

Q1) a)   Explain how NC & CNC machines are different than Robot.   **[8]**

b)   What is a work envelop of a Robot? Explain with an example and a neat diagram.   **[8]**

OR

Q2) a)   Compare fixed, flexible and programmable automation.   **[8]**

b)   Write the BRA defination of Robot, and hence write short note on ISO defination for Robot.   **[8]**

Q3) a)   Explain: **[8]**

i)   Continuous path motion.

ii)   Point to point motion.

b)   Give Robot Classification according to control methods. Explain indetails.   **[8]**

OR

Q4) a)   Explain SCARA Robot.   **[8]**

b)   Define: **[8]**
i)   Spatial resolution.
ii)   Reach.
iii) Degree of freedom.
iv)   Compliance.

P.T.O.

Q5) a) Write effects of pre and post multiplication of transformation. **[9]**

b) Let a point P = (0.5 -0.5 1)^T is rotated along x, y, z axis simulteneously by an angle 30^0, 45^0, 60^0 respectively. Find the co-ordinates of final point p after rotation. **[9]**

OR

Q6) Write Short Notes on: **[18]**

a) Different Euler angle systems.

b) Homogeneous Co-ordinate.

c) Concept of Homogeneous transformation.

SECTION-II

Q7) a) Explain D. H. parameters and derive the expression which relates two consecutive co-ordinate frames with the help of neat sketch. **[9]**

b) Explain direct approach method for inverse kinematic problems of manipulator. **[9]**

OR

Q8) a) Enlist rules for establishing link co-ordinate frame. **[9]**

b) Discuss forward solution of robotic manipulator for STANFORD Robot. **[9]**

Q9) a) Compare Newton method & Lagrange method for Robot dynamics. **[8]**

b) Derive the following non conservative force equation. using Lagrange method. **[8]**

$$Fi = \frac{\delta}{\delta t}\left(\frac{\delta L}{\delta qi}\right) - \frac{\delta L}{\delta qi}$$

OR

Q10) a) Explain equation of motion using KE and PE. **[8]**

b) Derive the Euler - Lagrange equation for Robot dynamic. **[8]**

Q11) a)   Explain spray-painting application of Robot.   **[8]**

b)   Explain JPC and RMPC.   **[8]**

<div align="center">OR</div>

Q12) a)   Give classification of Robot specific languages.   **[8]**

b)   Give selection criteria of Robot, sensors used, selection of Drives and actuators, and method of control for robot application in welding in an industry.   **[8]**

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B.E. (E & TC)

DIGITAL IMAGE PROCESSING

(2008 Course) (Elective - I) (404184(A)) (Sem. - I)

Time : 3 Hours]　　　　　　　　　　　　　*[Max Marks : 100*

Instructions to candidates :

　　1)　Answers to the two sections should be written in separate books.

　　2)　Neat diagrams must be drawn wherever necessary.

　　3)　Figures to the right indicate full marks.

　　4)　Assume suitable data, if necessary.

SECTION-I

Q1) a)　With help of neat diagram explain various step in image processing.
　　　　　　　　　　　　　　　　　　　　　　　　　　　[8]

　　b)　With reference to relation between pixel explain　　**[8]**
　　　　i)　　4 connectivity
　　　　ii)　8 connectivity.
　　　　iii)　Mixed connectivity.

OR

Q2) a)　Explain in detail the MTF for human vision.　　**[8]**

　　b)　Explain the following:　　　　　　　　　　**[8]**
　　　　i)　　Mean and variance of image.
　　　　ii)　Histogram of image.

Q3) a)　Explain how power law transformation can be used for gamma correction.　　　　　　　　　　　　　　　**[8]**

　　b)　Justify the statement median filter is an effective tool to minimize salt & pepper noise considering the image.　　　**[8]**

$$I=\begin{bmatrix} 24 & 22 & 33 & 25 & 22 & 24 \\ 34 & 255 & 24 & 0 & 26 & 23 \\ 23 & 21 & 32 & 31 & 28 & 26 \end{bmatrix}$$

OR

P.T.O.

Q4) a) Perform histogram equalization of the image. **[8]**

$$I = \begin{bmatrix} 4 & 4 & 4 & 4 & 4 \\ 3 & 4 & 5 & 4 & 3 \\ 3 & 5 & 5 & 5 & 3 \\ 3 & 4 & 5 & 4 & 3 \\ 4 & 4 & 4 & 4 & 4 \end{bmatrix}$$

Containing gray levels for 0 to 7. Also draw the histogram before & after equalization.

b) What is a color model? Compare RGB & YIQ color model with their applications. **[8]**

Q5) a) What is DCT? Explain the different properties of DCT, **[10]**

b) With reference to 2D transform explain: **[8]**
   i) Basis image
   ii) Symmetry
   iii) Separability
   iv) Energy compaction.

OR

Q6) a) What is KL transform. Discuss its properties & application. **[6]**

b) Compare DFT & DCT. **[6]**

c) Write a note on Haar Transform. **[6]**

SECTION-II

Q7) a) What are various data redundancies identified in an image? Explain. **[8]**

b) What is JPEG? Explain image compression using JPEG, **[8]**

OR

Q8) a) Explain in brief lossless predictive coding with help of encoder & decoder. **[8]**

b) Explain arithmetic coding with example? compare it with Huffman coding. **[8]**

Q9) a) Explain edge detection procedure using gobel mark? Discuss the problem of edge detection in noisy image. **[8]**

b) A binary image X & structuring element B are given below. **[8]**

$$X = \begin{bmatrix} 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 1 & 1 & 1 & 0 & 0 \\ 0 & 1 & 1 & 1 & 0 & 0 \\ 0 & 0 & 1 & 1 & 1 & 0 \\ 0 & 0 & 1 & 1 & 1 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 \end{bmatrix} \qquad B = \begin{bmatrix} 0 & 1 & 0 \\ 1 & 1 & 1 \\ 0 & 1 & 0 \end{bmatrix}$$

Perform $y = X \oplus B$.

OR

Q10) a) Compare the preformance of first & second derivative w. r. t. an image? Which one would you prefer for detecting edges? Why? **[8]**

b) What is Hough transform? How it is used for edge linking. **[8]**

Q11) a) Explain the difference between image enhancement & restoration? List various algorithm used for the processing in case of restoration. **[9]**

b) Explain the algorithm of character recognition in Image Processing. **[9]**

OR

Q12) a) With the help of neat diagram explain image degradation model. **[5]**

b) Write a note on Gaussian low Pass filtering for images. **[5]**

c) Explain an algorithm for Fingerprint recognition in Image Processing. **[8]**

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P 813   **[4064] - 495**

B.E. (E & T/C)

EMBEDDED SYSTEM & RTOS

(2008 Course) (404184(B)) (Sem. - I) (Elective - I)

Time : 3 Hours]   *[Max Marks : 100*

Instructions to candidates :

1) *Attempt Q1 or Q2, Q3 or Q4, Q5or Q6 from section I.*
2) *Attempt Q7 or Q8, Q9 or Q10, Q11 or Q12 from section II.*
3) *Answers to each section should be written in separate answer book.*
4) *Assume suitable data, if necessary.*

SECTION-I

Q1) a) Explain following design metrics and its significance.   **[9]**
   i) NRE cost;
   ii) Time to market;
   iii) Power
   What measures will improve these parameters.

   b) Explain Bluetooth Protocol.   **[4]**

   c) State the features and applications of Win CE.   **[3]**

OR

Q2) a) Explain CAN protocol & its applications.   **[6]**

   b) Which design metrics will be given more priority for designing Weather monitoring system in remote area.   **[6]**

   c) List features of Android framework. Why it is popular in mobile phones   **[4]**

Q3) a) Explain with suitable block diagram architecture of LPC2148   **[9]**

   b) Interface LCD to LPC2148. Write C program to display 'Hello' on line 1 And 'Friends' on line2.   **[9]**

OR

Q4) a) Compare Arm 7, Arm 9 and Arm cortex series processors stating Features And applications of each.   **[9]**

   b) Interface 12C based (external) 12 bit ADC to LPC 2148 also write C program to display ADC value on hyper terminal.   **[9]**

P.T.O.

Q5) a) Compare various software architectures. Which one is better justify your answer. **[8]**

b) In what situation Semaphore is used explain with C Program. **[8]**

OR

Q6) a) Explain need of Mailbox and demonstrate its use with C program. **[8]**

b) How memory management function is carried out in MicroC RTOS. **[8]**

SECTION-II

Q7) a) Explain the role of following in Embedded Linux system.

    i)   Boot loader

    ii)   BusyBox

    iii) Binutility

    iv) Glibc **[8]**

b) State the detailed steps in writing and testing Kernel module. **[8]**

OR

Q8) a) List and explain various file systems used in Embedded Linux.

Which one is right candidate justify your answer? **[8]**

b) State detailed steps involved in writing and testing a device driver.

What is major and minor number? **[8]**

Q9) a) Comare features and IPC of QNX and Neucleus RTOS. **[8]**

b) What is software design cycle? State various models used for it. **[6]**

c) Why embedded Linux is preferred in Embedded system design? **[4]**

OR

Q10) a) Compare Vxworks with MicroC RTOS, in what respect it is superior than MicroC. **[6]**

b) Explain V model used in software development cycle. **[8]**

c) State salient features of Symbian RTOS. **[4]**

Q11) a) State hardware requirement of Mobile Phone. Suggest suitable Processor, memories and special I/O's for it. **[8]**

b) Explain tasks, its priorities and IPC used in smart energy meter. **[8]**

OR

Q12) a) What are the requirements of Point of Sales terminal. How they are linked To hardware design? **[8]**

b) Explain in detail software architecture used in designing embedded system for ECG macine. **[8]**

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P1190
[4064]-497

B.E. (E & TC)
MICROWAVE COMMUNICATION AND RADAR
(2008 Course) (Elective - I) (Sem. - I) (404184 (D))

Time : 3 Hours]
[*Max. Marks : 100*

Instructions to the candidates:

1) *Attempt Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6 from Section - I, and Q.7 or Q.8, Q.9 or Q.10, Q.11 or Q.12 from Section - II.*
2) *Answers to the two sections should be written in separate answer books.*
3) *Neat diagrams must be drawn wherever necessary.*
4) *Figures to the right indicate full marks.*
5) *Assume suitable data, if necessary.*
6) *Use of logarithmic tables, slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.*

SECTION - I

Q1) a) Explain the IEEE electromagnetic frequency spectrum. **[4]**

b) Explain advantages and applications of microwave. **[4]**

c) An air filled rectangular waveguide has dimensions of 6cm X 4cm. It propagates a signal at 3GHz. Compute the following for TE10 mode.

   i)   Cut-off frequency   ii) Guide wavelength
   iii) Phase constant   iv) Phase velocity
   v)   Group velocity   vi) Wave impedance   **[8]**

OR

Q2) a) What is waveguide? Explain the parameters of rectangular waveguide. **[6]**

b) Comment on: Similarities and comparison of coaxial cable and waveguide.**[4]**

c) Write a note on

   i) Re-entrant type of cavity resonator.
   ii) Power losses and power transmission in rectangular Waveguide. **[6]**

P.T.O.

Q3) a) The collinear ports 1 and 2 of magic tee are terminated by impedances of reflection coefficients $\Gamma 1=0.5$ and $\Gamma 1=0.6$. The difference port 4 is terminated by an impedance with reflection coefficient of 0.8. If 1 watt power is fed at sum port 3. Calculate the power reflected at port 3 and power divisions at the other ports. **[6]**

b) Explain the properties of H-Plane Tee using s-matrix. **[6]**

c) Explain the faraday's rotation principle? Draw and explain isolator. **[6]**

OR

Q4) a) With the help of diagram explain: magic Tee used to measure the impedance. **[6]**

b) Write a note on :
   i) Microwave Filters
   ii) Wave guide transitions **[6]**

c) Explain two hole directional coupler along with its parameters
   i) Coupling factor
   ii) Directivity
   iii) Isolation **[6]**

Q5) a) Comment on: HF limitations of conventional tubes. **[4]**

b) Compare TWTA and Klystron Tube. **[4]**

c) Explain the working of cavity magnetron. **[8]**

OR

Q6) a) A reflex Klystron operates at the peak mode n=2 with Vo=280v, Io=22mA and a signal voltage V1 = 30V.
   Determine:
   i) Input Power
   ii) Output Power
   iii) Efficiency **[8]**

b) Explain the operation of travelling wave tube along with slow wave structure. **[8]**

SECTION - II

Q7) a) With the help of two valley theorem explain the working of Gunn diode. **[8]**

b) Write a note on: Varactor Diode **[4]**

c) Explain the working of Microwave transistor. **[4]**

OR

Q8) a) Explain the working principle of tunnel diode. **[8]**

b) Write a note on: **[8]**
i) PIN diode.
ii) Schottky barrier diode

Q9) a) A slotted line is used to measure the frequency and it was found that the distance between the nulls is 1.85cm. Given guide dimensions are (3×1.5) cm. Calculate the value of frequency. **[6]**

b) Explain Roberts and Von-Hipple method of dielectric constant measurement. **[6]**

c) Write a note on: Measurement of noise factor. **[6]**

OR

Q10) a) Two identical directional coupler (20db) in waveguide are used to sample a incident and reflected powers. Output of two couplers is 3mw and 0.1mw respectively. Find.
i) Value of VSWR in main waveguide and
ii) Reflected power. **[6]**

b) Explain the phase shift measurement using double minimum method at microwave frequency. **[6]**

c) How calorimetric method is used for measurement of microwave power. **[6]**

Q11) a) Derive the RADAR range equation and explain the factors affecting the RADAR range. **[6]**

b) Explain the advantages and limitations of A-Scope radar display. **[4]**

c) With the help of Block diagram explain in working of the moving target indication RADAR. **[6]**

OR

Q12) a) A guided missile tracking radar has the following specifications.

     i)   Transmitted pulse= 400kw,

     ii)   Pulse Repetition frequency = 1500 pps,

     iii)   Pulse width=0.8μsec.

         Determine: Unambiguous range, duty cycle, average power, suitable bandwidth for radar.   **[6]**

   b) Explain the Planar Array Radar.   **[4]**

   c) With the help of block diagram explain the operation of FM-CW radar.**[6]**

■■■

P1129   **[4064]-507**

B.E. (Instrumentation & control)

PROJECT ENGINEERING & MANAGEMENT

(2008 Course) (Sem. - I) (406263)

Time : 3 Hours]   [*Max. Marks : 100*

Instructions to the candidates:

1) *All questions are compulsory.*

2) *Answers to the two sections should be written in separate answer books.*

3) *Neat diagrams must be drawn wherever necessary.*

4) *Figures to the right indicate full marks.*

5) *Assume suitable data if necessary.*

SECTION - I

Q1) a) What are various types of organization structures, Explain in detail? Draw an organizational structure for any manufacturing firm.   **[10]**

b) Explain Interdepartmental, Inter organizational and Multi Agency Interaction.   **[6]**

c) What are various types of projects? Explain.   **[2]**

OR

Q2) a) What is Pure Matrix Organizational structure? What are the advantages of this type organizational structure? Draw an organizational structure for consultancy firm.   **[10]**

b) Explain the interaction between Electrical, Mechanical & Safety departments with Instrumentation department.   **[6]**

c) What is degree of automation in Instrumentation & control projects? **[2]**

Q3) a) Consider the following network for a small MIS project given below.**[10]**

Activity	Initial/final node	Optimistic time	Estimated Time
A	1	2	2
B	1	3	3
C	1	4	3
D	2	5	3
E	2	9	3
F	3	5	1
G	3	6	2
H	3	7	3
I	4	7	5
J	4	8	3
K	5	6	3
L	6	9	4
M	7	9	4
N	8	9	3
O	9	10	2

    i) Develop the network and identify the critical path

    ii) Calculate the total Slack time

    iii) Repeat parts i & ii assuming that the estimated time for activity c is 4

  b) Write short notes on: **[6]**

    i) WBS.

    ii) Hot commissioning and Cold commissioning.

<p align="center">OR</p>

Q4) a) Write the differences between PERT and CPM methods. In R&D type project which method is preferred Why? **[10]**

  b) What are the various project life cycle phases. Explain Divestment phase in detail. **[6]**

Q5) a) Prepare Technical specification sheet in S-20 format for: **[10]**

    i) Turbine Type Flow Meter

    ii) Pressure Gauge

b) What is P&ID.? With neat sketch draw a P&ID for any known process with all aspects of P&ID. **[6]**

OR

Q6) a) Explain what is P & I diagram? Draw the P & I diagram for boiler with **[10]**
  i) Three Element Level Control
  ii) Fuel Air Ratio Control
  iii) Steam Temperature Control.

b) Write the various standards used in Instrumentation projects. Write the importance of all those standards. **[6]**

SECTION - II

Q7) a) What is loop wiring diagram? Prepare the loop wiring diagram for a loop having following instruments: **[10]**
  i) Capacitance type level sensor
  ii) Indicating controller panel mounted
  iii) High low level alarm point and recorder (Pane mounted)
  iv) Pneumatically operated control valve for the supply of liquid in the tank.

b) Explain the importance of Plant Layouts and GA drawing. **[6]**

OR

Q8) a) What are BOM and MBOM? Give its importance. **[8]**

b) Draw the installation sketch for DP cell used for the sensing the pressure of dry gas. **[8]**

Q9) a) What is bidding package? Explain the importance of bid specifications. Write the bid specifications for Control Panel. **[10]**

b) What are the different steps involved in procurement activities of project instrumentation items? **[8]**

OR

Q10) a) Enlist & explain the key points required to be considered while issuing P.O. to the vendor supplier. **[9]**

b) Explain the documents required during the Installation and Commissioning. **[9]**

Q11) a) Write the differences among the various types of control panels. For a chemical application with less no of controls but having critical control loop which control panel will be used, explain. **[8]**

b) Write the types of control panels. Design an appropriate control panel for the application in Q. No. 5b or Q. No. 6a. **[8]**

OR

Q12) a) What is Ergonomics? What are different Ergonomic considerations for design of Control Panel? **[8]**

b) Write notes on: **[8]**

i) Intelligent Operator Interface

ii) Installation details of a D.P. Transmitter.

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P1191   **[4064]-510**

B.E. (Instrumentation and Control)
ADVANCED CONTROL SYSTEMS
(2008 Course) (Elective - I) (406264 C) (Sem. - I)

Time : 3 Hours]   [*Max. Marks : 100*

Instructions to the candidates:
 1) *Assume suitable data, if necessary.*
 2) *Figures to the right indicate full marks.*
 3) *Answer any three questions from each section.*

SECTION - I

Q1) Attempt following:

 a) For each of the following systems, find and classify all equilibrium points.**[12]**

   i) $\dot{x}_1 = x_2$

        $\dot{x}_2 = -x_1 + x_1^3/6 - x_2$

   ii) $\dot{x}_1 = -x_1 + x_2$

        $\dot{x}_2 = 0.1x_1 - 2x_2 - x_1^2 - 0.1x_1^3$

 b) What is the nonlinear control system? Explain any two typical nonlinearities in brief.   **[6]**

OR

Q2) Attempt following:

 a) Determine the Describing function of the saturation nonlinearity.   **[12]**
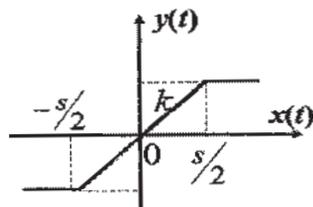
 b) Define limit cycle and distinguish three kinds of limit cycles.   **[6]**

Q3) Attempt following: **[8]**

a) Investigate the stability of following non linear system using direct method of Liapunov.

$$\dot{x}_1 = x_2$$

$$\dot{x}_2 = -x_1 - x_1^2 x_2$$

b) Determine whether following quadratic form is positive definite or not. **[8]**

$$Q(x) = 10 x_1^2 + 4 x_2^2 + x_3^2 + 2 x_1 x_2 - 2 x_2 x_3 - 4 x_1 x_3$$

OR

Q4) Attempt following :

a) A second order system represented by $\dot{x} = Ax$ where

$$A = \begin{bmatrix} 0 & 1 \\ -1 & -1 \end{bmatrix}$$

Assuming matrix Q to be identity matrix, solve for matrix P in the equation $A^T P + PA = -Q$.

Use Liapunov theorem and determine the stability of the system. Write the Liapunov function V(x). **[10]**

b) Explain stability analysis by describing function method. **[6]**

Q5) Attempt following:

a) In MRAC we want the error e = y - y$_m$ to go to zero, for this find a Liapunov function and adaptation mechanism to achieve it for given first order system. **[10]**

Process :

$$\dot{y} = -ay + bu$$

Model :

$$\dot{y}_m = -a_m y_m + b_m u_c$$

Where a$_m$ > 0 and the reference u$_c$ is bounded.

Controller:

$$u = \theta_1 u_c + \theta_2 y$$

b) Explain in brief direct and indirect model reference adaptive control with block diagram. **[6]**

Q6) Attempt following:

a) The dynamics of mass-sprig-damper system is given as **[10]**

$$m \ddot{y} + c \dot{y} + ky = u$$

Where m = 1kg, c= 1N/ms and k= 1N/m. Design a MRAC the system response follows the reference model given by.

$$\ddot{y}_m + 16.14 \, \dot{y}_m + y_m = r$$

Select r(t) = 2 and 2sin (3t)

b) Briefly discuss the essential aspects of an adaptive control system. **[6]**

SECTION - II

Q7) Attempt following:

a) Explain indirect self tuning regulator using least squares estimator for $Ay(t) = B(u(t) + v(t))$

where y is the output, u is the input of the process, and v is a disturbance Also give the algorithm for obtaining it. **[10]**

b) Explain self tuning regulator using block diagram. **[6]**

OR

Q8) Attempt following

a) Consider the process $G(s) = \dfrac{1}{s(s+a)}$ **[10]**

Where a is an unknown parameter. Assume that the desired closed loop

system is $G_m(s) = \dfrac{\omega^2}{s^2 + 2\varsigma\omega s + \omega^2}$

Construct continuous indirect self tuning algorithm for the system.

b) Explain recursive estimator used in self tuning regulator. **[6]**

Q9) Attempt following:

   a) Explain adaptive control technique for temperature control in CSTR system. **[8]**

   b) List different industrial products incorporating adaptive control. Explain any one in detail. **[8]**

<div align="center">OR</div>

Q10) Attempt following:

   a) Explain application of adaptive controller in distillation column control.**[8]**

   b) Explain in detail general purpose adaptive regulator. **[8]**

Q11) Attempt following : **[10]**

   a) A first order system is described by the differential equation

$$\dot{x}(t) = 2x(t) + u(t)$$

It is desired to find the control law that minimizes the performance index

$$J = \frac{1}{2} \int_{0}^{t_f} \left(3x^2 + \frac{1}{4}u^2 \right) dt$$

$t_f = 1$ sec.

   b) Explain requirements for formulation of an optimal control problem.**[8]**

<div align="center">OR</div>

Q12) Attempt following :

   a) Obtain the control law which minimizes the performance index **[10]**

$$J = \int_{0}^{\infty} \left(x^2 + u^2 \right) dt$$

For the system

$$\begin{bmatrix} \dot{x}_1 \\ \dot{x}_2 \end{bmatrix} = \begin{bmatrix} 0 & 1 \\ 0 & 1 \end{bmatrix} \cdot \begin{bmatrix} x_1 \\ x_2 \end{bmatrix} + \begin{bmatrix} 0 \\ 1 \end{bmatrix} u$$

   b) Discuss performance measures for optimal control problems. **[8]**

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B.E. (Instrumentation and Control Engineering)
ADVANCED DIGITAL SIGNAL PROCESSING
(Sem. - I) (2008 Course) (Elective - II) (406265 (C))

Time : 3 Hours]   [*Max. Marks : 100*

Instructions to the candidates:
1) *Answer three questions from Section I and three questions from Section II.*
2) *Answers to the two sections should be written in separate answer books.*
3) *Neat diagrams must be drawn wherever necessary.*
4) *Figures to the right indicate full marks.*
5) *Assume suitable data, if necessary.*

SECTION - I

Q1) a) The interconnection of expander with LTI system is generally as shown in following figure.

$x(n) \rightarrow \boxed{G(z)} \rightarrow \boxed{\uparrow L} \rightarrow y_1(n)$

Now if we interchange the blocks as follows

$x(n) \rightarrow \boxed{\uparrow L} \rightarrow \boxed{H(z)} \rightarrow y_2(n)$

Derive the relationship between $H(z)$ and $G(z)$ to get $y_1(n) = y_2(n)$. **[8]**

b) Show that the decimators and expander is a linear and time varying system. **[8]**

OR

Q2) a) Explain the different steps in sampling rate conversion by a rational factor 1/D. **[8]**

b) For M-fold Decimator, show that

$$Y(z) = \frac{1}{M} \sum_{k=0}^{M-1} X(z^{\frac{1}{M}} W_M^k)$$

Where, $W_M = e^{-J\frac{2\pi}{M}}$, $y(n)$ -is output and $x(n)$- *is input to the decimator.*

[8]

P.T.O.

Q3) a) Use the Levinson-Durbin algorithm to solve the autocorrelation normal equations and find a third order all-pole model for a signal having autocorrelation values $r_x(0) = 1, r_x(1) = 0.5, r_x(2) = 0.5, r_x(3) = 0.25$ **[9]**

b) Write a short note on 'Levinson-Durbin algorithm'. **[9]**

<div align="center">OR</div>

Q4) a) Determine the lattice coefficients corresponding to the FIR filter with system function $H(z) = A_3(z) = 1 + \dfrac{13}{24}z^{-1} + \dfrac{5}{8}z^{-2} + \dfrac{1}{3}z^{-3}$ **[9]**

b) Derive the relation of autocorrelation sequence and filter coefficients for AR process i.e. Yule Walker equations or normal equations. **[9]**

Q5) a) What are the non-parametric methods in power spectrum estimation? Explain any one in detail. **[8]**

b) Define periodogram. Explain the estimation of power density spectrum of random signals. **[8]**

<div align="center">OR</div>

Q6) a) What are the parametric methods in power spectrum estimation? Explain any one in detail. **[8]**

b) Explain how the averaging of periodogram is used in Bartlet method. **[8]**

<div align="center">

SECTION - II

</div>

Q7) a) What is adaptive filtering? Explain any one application of adaptive filtering. **[8]**

b) Describe the LMS algorithm for adaptive filtering. **[8]**

<div align="center">OR</div>

Q8) a) What are the main advantages of adaptive filters over fixed filters? **[8]**

b) Explain in brief any three medical applications of adaptive filtering. **[8]**

Q9) a) What are the different DSP processors available in the market? List out the important features of the DSP. **[9]**

b) Draw and explain in detail the architecture of DSP processor. **[9]**

Q10) a) Compare fixed point & floating point data format in DSP processor.**[9]**

b) Write the assembly language program for implementation of sum of product. **[9]**

Q11) a) What is the necessity of time-frequency analysis? State the advantages of STFT over FT. **[8]**

b) State the definition of CWT and its properties. **[8]**

OR

Q12) a) Compare FT, STFT and CWT. **[8]**

b) Describe the steps in computation of CWT. **[8]**

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P1133   **[4064]-523**

B.E. (Printing)

ADVERTISING AND MULTIMEDIA

(2008 Course) (Sem. - I) (408285)

Time : 3 Hours]   [*Max. Marks : 100*

Instructions to the candidates:

   All questions are compulsory.

SECTION - I

Q1) Explain any print advertisement/case based upon AIDA model with details.
                                                                   [18]

OR

Write short notes on :

   a)   Relation of product advertising and PLC.   **[9]**

   b)   Designing of a message.   **[9]**

Q2) Explain any case based on target marketing. State its features, advantages and limitations if any.   **[16]**

OR

What is financial advertising? Which other types of advertising are complementary to it? Explain in details.   **[16]**

Q3) a)   What is medium? Which media are used for advertising?   **[8]**

   b)   Explain in details features of print media.   **[8]**

OR

   a)   Compare and contrast between :

       Print media   Vs   Electronic media.   **[8]**

   b)   Explain a case where print media scores higher over other media for advertising purpose.   **[8]**

SECTION - II

Q4) What is market segmentation? How is it effectively used by advertisers? State in details. **[16]**

<div align="center">OR</div>

What is product research? How is it significant for success of product in the market? **[16]**

Q5) What are different types of audience surveys? Explain each in details. **[16]**

<div align="center">OR</div>

Explain following points with respect to psychology in advertising: **[16]**

a) Consumer behavior

b) Motivation and involvement

c) Attitude

d) Personality and self concept

e) Learning and Memory

f) Information processing

g) External environment

Q6) What is campaign planning? What are the parameters which govern the planning of a campaign? **[18]**

<div align="center">OR</div>

What are the types of campaigns? Explain each with suitable case. **[18]**

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P 580   **[4064] - 532**

B.E. (Chemical Engineering)
CHEMICAL REACTION ENGINEERING - II
(2008 Revised Course) (Sem. - I) (409344)

Time : 3 Hours]   *[Max Marks : 100*

Instructions to candidates :

   1)   *Answer any three questions from each Section.*

   2)   *Answers to the two sections should be written in separate books.*

   3)   *Neat Diagram must be drawn whenever necessary.*

   4)   *Figures to the right indicate full marks.*

   5)   *Use of logarithmic tables, slide rule, Mollier charts, electronic pocket calculator and steam table is allowed.*

   6)   *Assume suitable data, if necessary.*

SECTION-I

Q1) a)   In the fluid particle reaction, derive the expression with suitable sketch for unreacted core model with gas film is a rate controlling step. **[10]**

   b)   Discuss limitations of shrinking core model for fluid particle reaction. **[8]**

OR

Q2)   A feed consisting of 25% of 60-μ-radius particles, 45% of 90-μ-radius particles and 30% of 150-μ-radius particles with rate 800 gm solids/min is to be reacted in a fluidized bed (contains 10 kg solids) steady state flow reactor. A fluidizing reactant is in the gas phase and the time required for complete conversion is 4, 8 and 15 min for the three sizes of feed at operating condition. The solids are hard and unchanged in size and weight during reaction. Without cyclone separator the solids are entrained by the fluidizing gas. The elutriation velocity constant for the operating conditions and bed height is estimated to be K = (500μ^2/min)R^2. Where R is the particle radius in microns. Calculate the conversion with chemical reaction control and compositions of all streams (Underflow, Carryover, and fluidized bed). **[18]**

P.T.O.

Q3) a) A fluid-fluid reaction of type: **[8]**

   A (From Gas) + bB(Liquid)→Product (Liquid)

   takes place in reactor. A reaction is fast with (i) moderate C_B and (ii) High C_B. Derive the rate expression for both cases.

   b) Derive the rate expression for aerobic fermentation and define Marangoni effect. **[8]**

OR

Q4) Benzene is to be chlorinated in a tower by countercurrent contacting with a stream of pure gaseous chlorine. The reaction is slow, elementary, and irreversible. **[16]**

   C_6H_6 (liquid) + Cl_2 (gas)→C_6H_5Cl (liquid) + HCl (gas)
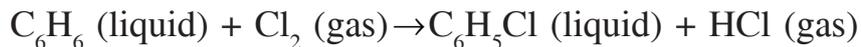
   The reaction occurs in the liquid between dissolved chlorine and benzene. The required assumptions are:

   Constant molar density of liquid, C_T = constant; Constant pressure in gas phase, π = constant; Plug flow of both streams; Small amount of dissolved and unreacted chlorine in liquid; Low solubility of HCl in liquid; The reaction of Cl_2 with C_6H_5Cl to be neglected. Derive the expression for the height of tower as a function of the system variables.

Q5) a) Explain the Langmuir treatment of adsorption observed in catalytic reactions. **[8]**

   b) Explain the BET method for determination of surface area of catalyst. **[8]**

OR

Q6) a) Explain catalyst poisoning in detail. **[8]**

   b) The following data were obtained at 70°C for the equilibrium adsorption of n-hexane on silica gel particles. **[8]**

Partial pressure of C_6H_{14} in gas, atm	C_6H_{14} adsorbed, g mol/(g gel)
0.0020	10.5×10^{-5}
0.0040	16.0×10^{-5}
0.0080	27.2×10^{-5}
0.0113	34.6×10^{-5}
0.0156	43.0×10^{-5}
0.0206	47.3×10^{-5}

   Determine the values of constants $\overline{C}_m$ and K_c for Langmuir isotherm by least-square-analysis.

SECTION-II

Q7) a) Derive and expression for gaseous diffusion in single cylindrical pores of catalyst. **[8]**

b) Explain and derive an expression for effectiveness factor. **[8]**

OR

Q8) a) Write a short note on mass transfer with reaction with the help of effectiveness factor in catalytic reactions. **[8]**

b) Explain Diffusion in porous catalysts with the help of suitable sketch. **[8]**

Q9) The catalytic reaction A→4R is run at 3.2 atm and 117°C in a plug flow reactor which contains 0.01 kg of catalyst and uses a feed consisting of the partially converted product of 20 liter/hr of pure unreacted A. The results are as follows: **[16]**

Run	1	2	3	4
$C_{A, in,}$ mol/lit	0.100	0.080	0.060	0.040
$C_{A, out,}$ mol/lit	0.084	0.070	0.055	0.038

Find a rate equation to represent this reaction.

OR

Q10) Explain the experimental method for finding rates in case of differential and integral reactors. **[16]**

Q11) Ethylene is to be hydrogenated by bubbling mixtures of H_2 and C_2H_4 through a slurry of Raney nickel catalyst particles suspended in toluene. The gas bubbles are formed at the bottom of a tubular reactor and rise in plug flow through the slurry. The slurry is well mixed, so that its properties are the same throughout the tube. A large concentration of small catalyst particles will be used. The temperature and pressure are to be 50°C and 10 atm. At these conditions the overall rate has been shown to be determined by the rate of diffusion of hydrogen from the bubble interface to the bulk liquid. This means that r_v is first order in the gas phase concentration of hydrogen, regardless of the intrinsic kinetics at the catalyst site. Estimate the volume of bubble-free slurry required to obtain a conversion of 30% for a hydrogen feed rate of 100 ft³/min (at 60 °F alderbank measured gas-liquid interfacial areas of 0.94 to 2.09 cm²/cm³ for bubble sizes

likely to be encountered in this system. Consider $a_g=1.0$ cm^2/cm^3 for bubble free slurry. Henry's constant for hydrogen in toluene at 50°C is 9.4 (g mol/cm^3)/(g mol/cm^3) and its diffusivity is 1.1×10^{-4} cm^2/s. the density and viscosity of toluene at 50°C are 0.85 g/cm^3 and 0.45 centipoises, respectively. Equimolar feed rates of ethylene and hydrogen will be used. **[18]**

OR

Q12) a) Explain in detail design of fluidized bed reactor. **[10]**

b) Explain Michaelis-Menton Kinetics with its model parameters. **[8]**

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P 581   **[4064] - 534**

B.E. (Chemical)
ENVIRONMENTAL ENGINEERING
(2008 Course) (409341(A)) (Sen. - I) (Elective - I)

Time : 3 Hours]   *[Max Marks : 100*

Instructions to candidates :

   1)   *Answer any Three questions from each section.*

   2)   *Answers to the two sections should be written in separate books.*

   3)   *Neat Diagrams must be drawn wherever necessary.*

   4)   *Figures to the right indicate full marks.*

   5)   *Use of logarithmic tables slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.*

   6)   *Assume suitable data, if necessary.*

SECTION-I

Q1) a)   Classify air pollutants according to source type. **[3]**

     b)   Give the source and harmful effects on the particulate matter on human health. **[3]**

     c)   Compare the conventional and high efficiency cyclones in terms of efficiency and dimensions. **[4]**

     d)   Write an essay on Air Pollution Episodes. **[8]**

<div align="center">OR</div>

Q2) a)   Write expressions for the following: **[4]**

       i)   Relationship between ppm and volume concentration & pollutant.

       ii)   Mass - Volume concentration.

     b)   The mean concentration of sulphur dioxide in Mumbai is $47g/m^3$. What is the equivalent concentration in ppm at 25^0C and 1 atm? **[3]**

     c)   State three adverse effects of population growth on the environment. **[3]**

     d)   A cylindrical ESP of diameter 0.3 m is used for separating pulverized coal flyash from a furnace gas stream. If the volumetric flow rate of the gas is 0.05 m^3/s, what will be the length of the precipitator for obtaining a collection efficiency of 99.90% what % change in electrode collection area is required to increase the collection efficiency from 99.90 to 99.95%? **[8]**

Q3) a) Draw a neat sketch of fabric filter and explain. **[4]**

b) Explain briefly the spray towers and centrifugal towers with neat diagrams. **[6]**

c) Explain Isokinetic sampling. **[3]**

d) Explain Stack Design. **[3]**

OR

Q4) a) Draw a neat sketch of settling chamber and explain. **[4]**

b) With sketch explain the working principle and equation of efficiency for electrostatic precipitator. **[4]**

c) Explain kyoto protocol. **[4]**

d) A conventional cyclone with diameter 1.0 m handles 3.0 m³/s of standard air carrying particles with a density of 2000 kg/m³. For $N_e = 6$, determine the cut size. Inlet width = 0.25 m and Inlet diameter = 0.5 m. **[4]**

Q5) Write short notes. **[16]**

a) Selection of particulate collector.

b) Green house effect.

c) Pollution control in industrial combustion operation.

d) Toxic effects of gaseous pollutants.

e) Adsorption method for removal of SO_2 gaseous pollutants.

OR

Q6) Write short notes on the following: **[16]**

a) Ozone depletion.

b) Chemical pollution.

c) Effect of carbon monoxide on humans.

d) Control of air pollution in automobiles.

SECTION-II

Q7) Discuss in detail the nine categories of water pollutants. **[18]**

OR

Q8) Discuss Biochemical Oxygen Demand and oxygen Sag Curve in detail. **[18]**

Q9) Describe Activated Sludge Process for wastewater Treatment. Mention the advantages and disadvantages. What factors influence the microbial composition in activated sludge process? **[16]**

OR

Q10) Describe the physical, Chemical and biological characteristic of wastewater. Why is it important to characterize the wastewater? **[16]**

Q11) Write short notes on: **[16]**

a) Composting.

b) Sampling Techniques in wastewater.

OR

Q12) Write short notes on: **[16]**

a) Advanced wastewater Treatment.
b) Recovery of materials from process effluents.

⌘⌘⌘

P 582   **[4064] - 535**

B.E. (Chemical)
MEMBRANE TECHNOLOGY
(Elective - I) (2008 Course) (Sem. - I) (409341(B))

Time : 3 Hours]   *[Max Marks : 100*

Instructions to candidates :

1) *Answer 3 questions from Section I and 3 questions from Section II.*

2) *Answers to the two sections should be written in separate books.*

3) *Neat Diagrams must be drawn wherever necessary.*

4) *Figures to the right indicate full marks.*

5) *Use of logarithmic tables slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.*

6) *Assume suitable data, if necessary.*

SECTION-I

Q1) a)   Explain the general criteria for selection of separation process for certain application.   **[6]**

b)   Explain advantages of membrane separation processes over the conventional processes.   **[6]**

c)   Air sample containing 20% O_2 & 80% N_2 is separated by a membrane that gives permeate concentration of 80%. Calculate the retention R and selectivity factor α.   **[6]**

OR

Q2) a)   Explain use of membrane processes for the following objectives: **[8]**

i)   Concentration.

ii)   Purification.

iii) Fractionation.

iv)   Reaction mediation.

b)   Classify the membrane separation processes based on: **[10]**

i)   Nature of the MOC.

ii)   Morphology or structure.

Q3) a) Explain use of polymers in the porous membranes for MF & uF processes. **[8]**

b) Explain use of inorganic materials as the nonporous membranes for GS & PV processes. **[8]**

OR

Q4) a) Explain the importance of glass transition temperature and degree of crystallinity on characteristic properties of polymers used as membranes. **[8]**

b) Explain the importance of chain flexibility in case of polymeric membrane materials. State the effect of character of main chain and of side chain or side groups. **[8]**

Q5) Explain the following methods of preparation of membranes. **[16]**

a) Sintering.   b) Track etching.

c) Template leaching.   d) Phase inversion.

OR

Q6) Explain the following methods of preparation of composite membranes.**[16]**

a) Interfacial polymerisation.

b) Dip coating.

c) Plasma polymerisation.

SECTION-II

Q7) Explain the following methods of characterisation of MF membranes. **[18]**

a) SEM.

b) Bubble-point method.

c) Mercury intrusion porometry.

d) Permeation measurements.

OR

Q8) Explain the following methods of characterisation of uF - membranes. **[18]**

a) Gas adsorption - desorption.

b) Thermoporometry.

c) Permporometry.

d) Liquid displacement.

Q9) a) Consider a membrane process used to separate a solute from water in a dilute solution. Derive the expression for dissipation function (i. e. entropy production) accompanying this process in the form. **[8]**

$$\phi = J_v \Delta p + J_d \Delta \Pi$$

where J_v = total volume flux

& J_d = diffusive flux.

b) State the phenomenological equations for J_v & J_d in terms of hydrodynamic pressure difference Δp & osmotic pressure difference $\Delta \Pi$, in terms of the coupling coefficients L_{11}, L_{12}, L_{21}, L_{22}. using these equations derive the expressions for- **[8]**

　　i) Hydrodynamic permeability.

　　ii) Osmotic permeability.

　　iii) Reflection coefficient of membrane.

<div align="center">OR</div>

Q10) a) What is electroosmosis? State the expression for dissipation function ϕ for this process. Hence derive the expressions for- **[8]**

　　i) Streaming potential.

　　ii) Electroosmotic flux.

　　iii) Electroosmotic pressure.

　　iv) Electric current generated due to solvent flow.

b) Explain solution diffusion mechanism for transport through nonporous membranes with the help of dual sorption theory. **[8]**

Q11) a) Explain concentration polarisation in pressure driven membrane processes. Derive the basic equation describing concentration polarisation in the form: **[8]**

$$\frac{C_m}{C_b} = \frac{\exp\left(\dfrac{J}{K}\right)}{R_{int} + \left[1 - R_{int} \exp\left(\dfrac{J}{K}\right)\right]}$$

Where the symbols have their usual meaning.

b) Explain gel layer model for describing concentration polarisation in uF process state the expression for solvent flux in the gel layer region. **[8]**

<div align="center">OR</div>

Q12) a) Explain osmotic pressure model for describing concentration polarisation in membranes. Derive the equation for solute flux for this model in the form : **[8]**

$$J = \frac{\Delta p - a\, C_b^n \exp\left(\dfrac{nJ}{K}\right)}{\eta\, R_m}$$

where the symbols have their usual meaning.

Also derive the expression for variation in J with Δp for two extreme conditions

  i)   High $\Delta\Pi$

  ii) $\Delta\Pi \to 0$.

b) Describe the construction of following membrane modules. **[8]**

  i)   Plate and frame type.

  ii) Spiral wound.

<div align="center">⌘⌘⌘</div>

P431   **[4064]-55**

B.E. (Production/Production S/W)
RELIABILITY ENGINEERING
(2003 Revised Course) (Elective - I) (411085) (Sem. - I)

Time : 3 Hours]   [*Max. Marks : 100*

Instructions to the candidates:

 1) **All questions are compulsory.**
 2) **Answers to the two sections should be written in separate answer books.**
 3) **Neat diagrams must be drawn wherever necessary.**
 4) **Figures to the right indicate full marks.**
 5) **Use of logarithmic tables, slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.**
 6) **Assume suitable data, if necessary.**

SECTION - I

Q1) a) Following table shows the results of life tests carried out on 100 components simultaneously:

Operating Time (Hours)	0	10	20	30	40	50	60	70	80	90	100
No. of Surviving components	100	90	81	73	66	60	55	50	45	41	37

Evaluate : Hazard Rate, failure density and reliability. Plot these functions against time. **[12]**

   b) Define reliability. What are the reasons for unreliability of engineering systems? Explain briefly. **[4]**

                              OR

   a) Define **[6]**

      i) Hazard Rate

      ii) MTTF

      iii) Probability density function.

   b) Draw a "Bath Tub Curve" and explain the significance of each portion of the curve. **[6]**

   c) What is the relationship between MTTF and reliability. **[4]**

Q2) a) What is an "Event Tree"? How it can be used for evaluating system reliability? **[6]**

b) A system consists of 3 identical units. For successful working of the system, at least one unit must be operating. Using event tree analysis show that for such a system reliability R (t) is given by $3e^{-\lambda t} - 3e^{-2\lambda t} + e^{-3\lambda t}$. If the average failure rate of each machine is 1 in 1000 hrs, find out reliability of the system after 200 working hours. **[10]**

OR

a) Discuss briefly the systematic method of conducting FMEA in a system. How one can find out criticality of a component based on "Risk Priority Number"? **[10]**

b) What are the various logic gates commonly used in FMEA diagrams? State the use of Boolean Laws in FMEA. **[6]**

Q3) a) Following data refers to a short sample reliability test of an engineering component:

Failure Number	1	2	3	4	5	6	7	8
MTTF (Hours)	16	25	22	20	32	10	38	40

Calculate the reliability and plot it versus time (MTTF) using

i) Mean Ranking Method &

ii) Median Ranking Method. **[12]**

b) What is meant by "Reliability Effort function"? Explain its significance in Life Cycle Costing. **[6]**

OR

a) Discuss briefly the agree method for allocation of reliabilities to the components of the system. **[6]**

b) A system consists of 5 sub- systems in series. The system reliability goal is 0.995 for 20 hours mission time. Each subsystem consists of same number of modules. Following data are available:

Sub-system (i)	No. of Modules (Ni)	Importance factor (Wi)	Operating time (ti) Hours
1	25	1.00	20
2	80	0.97	18
3	45	1.00	20
4	60	0.93	14
5	70	1.00	20

Find out the individual reliabilities of the sub-systems. **[12]**

SECTION - II

Q4) a) In an active redundancy in a system having 2 identical units in parallel, show that

$$(MTBF)_{system} = 3/2 \ (MTBF)_{single \ unit}$$ **[6]**

b) What is meant by redundancy? Distinguish between

   i)   active

   ii) partially active and

   iii) passive redundancy. **[6]**

c) What are "tie sets" and "cut sets"? When do you use them? **[4]**

OR

a) Find out the reliability of the system in the figure shown by using conditional probability method. **[8]**
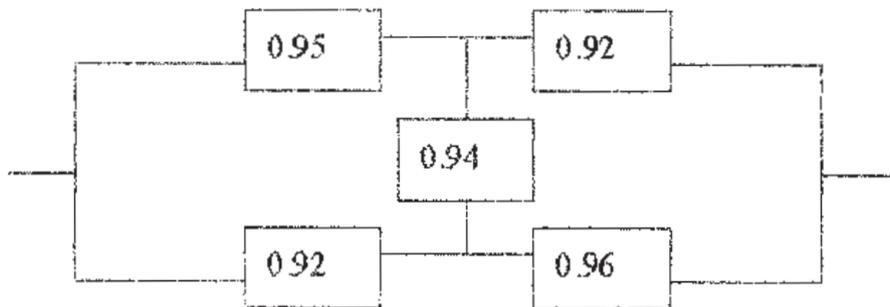
b) Explain clearly with suitable example matrix method of evaluating system reliability. **[8]**

Q5) a) Define availability and maintainability. How "Operational availability" is different from "inherent availability"? **[6]**

b) If the inherent availability of a system is 0.92 when the MTBF is 220 hours, what if the maximum value of MTTR? Assuming logistic time for administrative support is 30% of the total down time, find out the operational availability. **[6]**

c) Explain the significance of "safety margin" in engineering design reliability. **[4]**

OR

a) What is meant by "Reliability Centered Maintenance? Explain the part played by "CBM" (Condition Based Monitoring) in assuming specific level of reliability. **[8]**

b) Distinguish between Breakdown Maintenance and Preventive Maintenance. State any quantitative method of decision making in regarding suitability of Breakdown Maintenance and Preventive Maintenance. **[8]**

Q6) a) What is meant by accelerated testing of reliability? Clearly differentiate between Failure truncated tests and Time truncated tests. **[8]**

b) An accelerated test is terminated at the occurrence of 4th failure and has a MTBF of 500 hours with a confidence level of 90%. Find the lower bound and upper bound values for the true MTBF. Also find average MTBF and average failure rate. **[10]**

OR

a) Using Poisson's distribution for 'n' number of stand-by systems, shows that the MTBF is n+1/λ, Where λ is the failure rate of each unit. **[8]**

b) What is meant by Reliability growth? Explain the Duane reliability Growth Model. **[10]**

■■■

P587   **[4064]-565**

B.E. (Petrochemical)
NOVEL SEPARATION PROCESSES
(2008 Course) (Elective - I) (412404 B) (Sem. - I)

Time : 3 Hours]   [*Max. Marks : 100*

Instructions to the candidates:
 1) *Answer any three questions from each section.*
 2) *Answers to the two sections should be written in separate books.*
 3) *Neat diagrams must be drawn wherever necessary.*
 4) *Figures to the right indicate full marks.*
 5) *Use of logarithmic tables electronic pocket calculator and steam tables is allowed.*
 6) *Assume suitable data, if necessary.*

SECTION - I

Q1) Attempt <u>any three</u> from the following :   **[18]**

 a) Explain the process principles involved in Froth Flotation. Indicate its Industrial applications.

 b) Compare and contrast on Macroemulsions and Microemulsions with suitable examples.

 c) Classify membrane separation processes by giving examples and it's industrial applications.

 d) Write a note on "Selection criteria for separation processes".

 e) Discuss in brief the energy requirements for separation processes by giving suitable examples.

 f) Discuss the process principles involved in Ultrafiltration and Nanofiltration.

OR

Q2) Classify the models for gas separation by membranes. Develop cross flow model for membrane separation processes. State the assumption made. Discuss the solution strategy for different cases.   **[18]**

Q3) a) An 9 micron tubular membrane is used to recover salt A from a dilute solution. The solutions to either side are at 0.025 and 0.0045 kmol/m³, with mass transfer coefficients of 3.35×10^{-5} and 2.25×10^{-5} m/s respectively. The distribution coefficient is 0.79 and the diffusivity of A in the membrane is 2.99×10^{-11} m²/s.

    i) Calculate the percentage of total resistance to mass transfer contributed by the membrane.

    ii) Calculate the membrane area needed to allow recovery at 0.015 kmol/hr.

    iii) Flow inside the tube is turbulent and mass transfer follows the Gilliland, Sherwood & Linton correlation. If the velocities of both solutions are doubled, what will the membrane resistance now be?**[8]**

    b) A liquid containing dilute solute A at a concentration 3.15×10^{-2} kgmol/m³ is flowing rapidly by a membrane of thickness, 3.4×10^{-5} m. The solute diffuses through the membrane and its concentration on the other side is 0.55×10^{-2} kgmol/m³. The mass transfer coefficient k_{c1} is large and can be considered as infinite and $k_{c2} = 2.05 \times 10^{-5}$ m/s.

Data: Distribution coefficient = K' = 1.5

    Diffusivity, $D_{AB} = 7.2 \times 10^{-11}$ m²/ sec in the membrane.

    i) Derive the equation to calculate the steady state flux, N_A and make a sketch.

    ii) Calculate the flux and concentration at the membrane interfaces.**[8]**

<div align="center">OR</div>

Q4) a) Discuss the various membrane modules used for membrane separation processes. **[10]**

    b) Reverse osmosis of salt solution at 25ºC is tested with a 5.2×10^{-3} m² cellulose acetate membrane. On one side of the membrane is 1 mol NaCl/ kg H_2O solution at 60 atmospheres (abs.) pressure, on the other is 0.015 mol NaCl/kg H_2O at atmospheric pressure. The permeation rate is 96.15 ml/hour. Find the solvent permeability and the rejection rate. **[6]**

Q5) a) A membrane is to be used to separate a gaseous mixture of P and Q in one of the chemical complex near Pune. The following information is known:

Feed flow rate	=	3.1×10^5 cm³ (STP)/s
Feed composition of A	=	0.53 mole fraction
Desired composition of reject	=	0.27 mole fraction
Thickness of membrane	=	2.55×10^{-3} cm
Pressure on feed side	=	100 cm Hg
Pressure on permeate Side	=	25 cm Hg
Permeability of A, P_A	=	20×10^{10} cm³ (STP). cm/(s.cm².cm. Hg)
Permeability of B, P_B	=	10×10^{-10} cm³ (STP). cm/(s.cm². cm. Hg)

Assuming complete mixing model, calculate the following :
i) the permeate composition
ii) the fraction permeated
iii) membrane area **[10]**

b) Explain in brief the basic process principles involved in Reverse Osmosis. State the industrial applications. **[6]**

<div align="center">OR</div>

Q6) a) Write short notes on (Any Two) : **[8]**

i) Diffusion type model for Reverse osmosis

ii) Hydrotopes

iii) Adsorptive bubble separations

b) For the series resistance in membrane processes, draw the concentration profiles for following cases: **[8]**

i) Two liquid film and a solid.

ii) Two gas films and solid.

What are the final flux equations for above cases?

SECTION - II

Q7) Answer the following (Any three): **[18]**

a) Give classification of Chromatographic separations.

b) Differentiate physical and chemical adsorption.

c) Give list of types of adsorbents and it's commercial applications.

d) Discuss in brief the process principles involved in Gas Chromatography. Enlist it's field of applications.

OR

Q8) Activated carbon is used to adsorb ethanol vapor from an airstreams. Activated carbon is used to adsorb ethanol vapour from an airstreams. The lab. Experiment to investigate this has a bed 5.5 cm in diameter and 15 cm high. Exit data for an input of 0.75 liter/second are as follows: **[18]**

Data:

Time (hours)	0	3	3.5	4	4.5	5	5.5	6.0	6.2	6.5	6.8
C/C_o	0	0	0.002	0.030	0.155	0.39	0.65	0.90	0.94	0.97	0.99

i) Determine breakthrough time if break point is at $C/C_o = 0.05$.

ii) Calculate the height of a new column of the same diameter that has breakthrough at 8 hours.

iii) Calculate the diameter of this new column if it is to process 5 liter/min.

Q9) a) In gas chromatography, a plot of HETP as a function of the mobile phase velocity is described by the Van Deemter equation: **[6]**

$$HETP = A + B/u + Cu$$

Physically, what do the terms A, B and C represent? Calculate the optimum value of the mobile phase velocity and the plate height in terms of these parameters.

b) Two amino acids, glycine and alanine, were separated by liquid chromatography with the following results: **[10]**

Amino Acid	T_R (minutes)	W(minutes)
Glycine	4.3	0.5
Alanine	5.2	0.6

i) Calculate the resolution of amino acids.

ii) Calculate the plate number for alanine.

iii) What is the minimum plate numbers needed to provide a resolution of 1.5?

iv) How do you get this high plate number?

OR

Q10) a) You are working as Separation technologist in one of MNC. You company has been contracted to purify a new mixture, which has been produced by ABC company. Your research department has optimized the separation on two exiting columns and the production department needs to know which column can operate at the higher volumetric flow rates. Since the stationary phase chemistries are slightly different, each column is operated at different mobile phase mixture so you will need to take this consideration for your calculations. Suggest which column is suitable for given separation. **[10]**

Data:

Column-I	Column-II
Mobile Phase 50/50 MeOH/H_2O by weight	Mobile Phase 70/30 MeOH/H_2O by weight
d_{col} = 0.5 cm	d_{col} = 1 cm
L_{col} = 25.4 cm	L_{col} = 54 cm
ε_c = 0.4888	ε_c = 0.50
d_p = 10 μm	d_p = 10 μm

b) Define the following terms in connection with chromatographic separations and give appropriate equations (Any Three) : **[6]**

    i)   Partition coefficient (K).

    ii)   Retention Volume (V_R).

    iii)   Retention Ratio ®

    iv)   Capacity factor (k').

    v)   HETP.

    vi)   Resolution (R_s.)

Q11) a) Discuss in brief the process principles involved in Pressure Swing Adsorption (PSA) and Temperature Swing Adsorption (TSA) with industrial applications. **[8]**

b) The retention ratio in chromatography is defined as: **[8]**

$R = t_M / t_R$

Show that R is related to the capacity factor, given by equation:

$R = 1/k' + 1$.

<div align="center">OR</div>

Q12) Write Short notes on: (Any Three) : **[16]**

    i)   Ion Exchange operations: Principles and Applications.

    ii)   Bioseparation.

    iii) Super Critical Fluid Extraction.

    iv) Isoelectric Focussing.
    v)   Elution chromatography.

<div align="center">■■■</div>

P 589   **[4064] - 570**

B.E. (Petrochemical Engineering)
NATURAL GAS TECHNOLOGY
(412407(C)) (2008 Course) (Sem. - I) (Elective - II)

Time : 3 Hours]   *[Max Marks : 100*

Instructions to candidates :

1) *Answer Q. No. 1 or 2, 3 or 4, 5or 6 in section - I and 7 or 8, 9 or 10, 11or 12 in section - II.*

2) *Answers to the two sections should be written in separate answer books.*

3) *Neat Diagrams must be drawn wherever necessary.*

4) *Assume suitable data, if necessary.*

5) *Figures to the right indicate full marks.*

6) *Use of logarithmic table, slide rule and electronic pocket calculator is allowed.*

SECTION-I

Q1) a) Discuss the outlook for world gas production.   **[8]**

b) Elaborate on geographic distribution by type of gas.   **[8]**

OR

Q2) a) Discuss thermal gas reservoirs.   **[8]**

b) Elaborate on variety of composition of natural gas reservoirs.   **[8]**

Q3) a) Explain in detail sampling methods of natural gas.   **[8]**

b) Discuss dry gas, wet gas and associated gas.   **[6]**

c) Elaborate on analysis of composition of natural gas.   **[4]**

OR

Q4) a) Discuss the phase diagram of a reservoir fluid.   **[8]**

b) Find the viscosity for a gas with composition in mole%, of C_1 = 90.5, C_2 = 2.3 and C_3 = 2.3, at 3000 psia and 540 ^{0}R.   **[6]**

Data:

Component	Mi	Pci	Tci	μ lgi
C1	16.043	667.8	343.1	0.0110
C2	30.070	707.8	549.8	0.0092
C3	44.097	616.3	665.7	0.0082

P.T.O.

c) Discuss measurements taken during sampling. **[4]**

Q5) a) Elaborate on hydrate structures (diagrams are not necessary). **[6]**

b) Explain in detail phase diagram for hydrate formation. **[6]**

c) Write a short note on solubility of natural gas in water. **[4]**

OR

Q6) a) Discuss experimental method for determination of gas hydrate. **[6]**

b) Explain in detail modeling hydrate formation equilibria. **[6]**

c) Write a short note on hydrate formation during drilling. **[4]**

SECTION-II

Q7) a) Explain in detail dehydration of natural gas by adsorption. **[8]**

b) Give different properties of a suitable solvent. **[8]**

OR

Q8) a) Describe with flow sheet acid gas removal by amine scrubbing. **[8]**

b) A separator to be operated at 1000 psia, is required to handle a well stream with gas flow rate 7 mmscfd at GLR 40 bbl/mmscf. Determine the separator size required for: **[8]**
   i) a vertical separator,
   ii) a horizontal single-tube separator and
   iii) spherical separator.

Assume a liquid (oil + water) density of 52 lbm/ft^3, ideal gas with gravity 0.8, an operating temperature equal to 110 ^{o}F, a retention time 3 min and ½ full of liquid conditions.

Q9) a) Discuss LNG transport chains. **[6]**

b) Explain with flow sheet natural gas liquefaction using conventional cascade cycle. **[6]**

c) Write a short note on LNG carriers. **[6]**

OR

Q10) a) Explain in detail construction and working of reciprocating compressor. **[6]**

b) Elaborate on existing LNG terminal in India. **[6]**

c) Describe in detail different gas chains. **[6]**

Q11) a) Describe with flow sheet Fisher-Tropsch synthesis process. **[8]**

b) Write a short note on: **[8]**

   i) Production of synthesis gas by indirect conversion processes.

   ii) Thermal coupling process.

<div align="center">OR</div>

Q12) a) Describe with flow sheet routes for the chemical conversion of methane.

[8]

b) Elaborate on downstream utilization technologies for natural gas in petrochemical. **[8]**
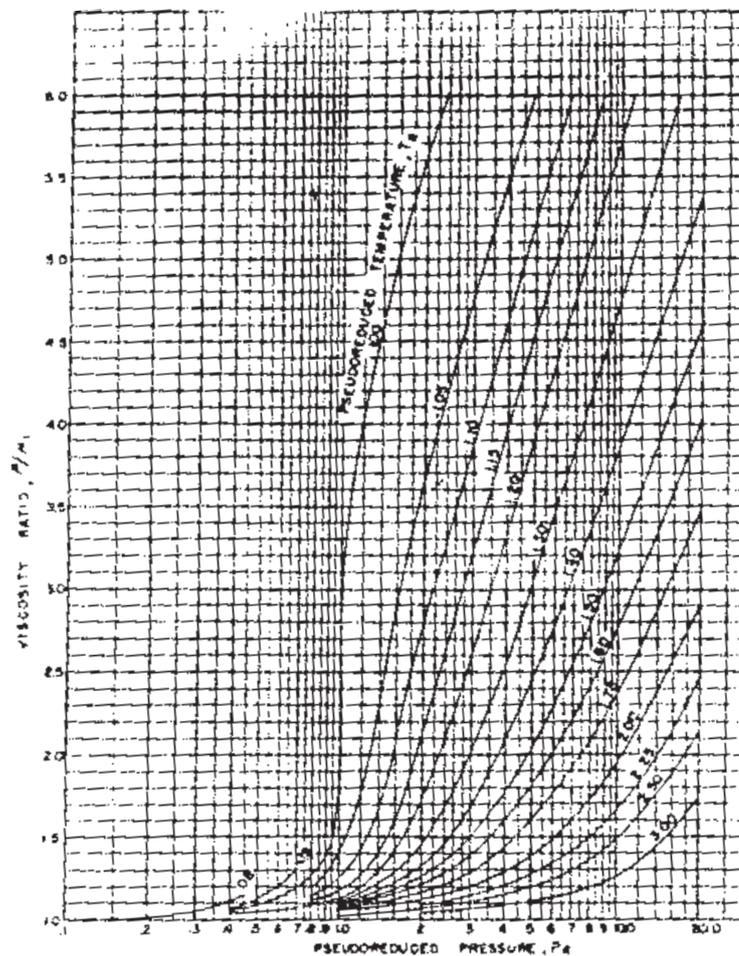
Figure 4.b Viscosity ratio versus pseudoreduced pressure.

<div align="center">⌘⌘⌘</div>

Total No. of Questions : 12]   [Total No. of Pages : 5

P596   **[4064]-586**

B.E. Computer

PRINCIPLES OF COMPILER DESIGN

(2008 Course) (Sem. - I) (410442)

Time : 3 Hours]   [*Max. Marks : 100*

Instructions to the candidates:

 1) *Answers to the two sections should be written in separate books.*
 2) *Neat diagrams must be drawn wherever necessary.*
 3) *Figures to the right indicates full marks.*
 4) *Assume suitable data, if necessary.*

SECTION - I

Q1) a) What is Analysis and Synthesis of a source code? What phases are involved in carrying out these tasks? Explain in brief with suitable example. **[8]**

 b) Construct SLR parser for the following Grammar. **[6]**
  S →aSA / ∈
  A → bB /cc
  B → bd / ∈

  Parse the sentence "aabbdcc" with the above SLR Parser. **[4]**

OR

Q2) a) Explain the Role of Lexical Analyzer. Explain Interaction between Lexical Analyzer and parser. Define Lexeme, Token and Pattern with suitable example. **[6]**

 b) For following Grammar.
  S → AaBb
  A → ∈
  B → ∈

  i)   Computer First and Follow Sets. **[3]**
  ii) Construct LL(1) Parser. **[6]**
  iii) Parse String "ab" with the above parser. **[3]**

P.T.O.

Q3) a) Consider the following Grammar for Pascal-Style declarations

Decl $\rightarrow$ varlist : type

Var-list $\rightarrow$ varlist, id/id

type $\rightarrow$ interger / real

Write an attributer Grammar for the type of variable. Draw Parse tree and Annotated Parse tree for the sentence"a, b, c: real" **[8]**

b) Explain following terms with suitable examples.
   i) S-Attributed Grammar
   ii) L - Attributed Grammar
   iii) Type Expression
   iv) DAG **[8]**

OR

Q4) a) Consider the following attributed grammar. **[12]**

Grammar Rule	Semantic Rule
S $\rightarrow$ ABC	B.u = S.u
	A.u = B.v + C.v
	S.v = A.v
A $\rightarrow$ a	A.v = 2 * A.u
B $\rightarrow$ b	B.v = B.u
C $\rightarrow$ c	C.v = 1

   i) Draw Parse tree for string "abc"

   ii) Draw Annotated parse tree

   iii) Draw Dependency Graph for association attributes and describe correct order of evaluation.

   iv) If S.u = 3 before evaluation what is S.v after evaluation?

b) Explain following function for Symbol Table generation. **[4]**

   i) Insert

   ii) Lookup

   iii) Enterscope

   iv) Exitscope

Q5) a) Write Three Address Code for given if Statement **[8]**

if (v1 < v2) {V3 = 10;}

else if (V1 >V2) {while (V1 > V3) {V3--;}

else if (V1 = = V2) {V3 = 30;}

V4[v1] = 89;

b) Write Quadruple and Triple representation of following Expression **[8]**

A = B + C * D / E + -F * -G

<div align="center">OR</div>

Q6) a) Translate following assignment statement into intermediate code **[8]**

A[i][j] := B[i][j] + C[i][j] * 10;

b) Write SDD for Do - While Statement and Explain **[8]**

<div align="center">

SECTION - II

</div>

Q7) a) Explain following storage allocation schemes with proper examples **[12]**

    i) Stack Storage Allocation

    ii) Static Storage Allocation

    iii) Heap Storage Allocation

b) Explain following terms with suitable example. **[6]**

    i) Control link

    ii) Access link

<div align="center">OR</div>

Q8) a) What is activation record? Explain its components with an example. **[10]**

b) Explain following parameter passing methods with suitable example. **[8]**

    i) Call by Value

    ii) Call by Reference

    iii) Call Restore

    iv) Call by name.

Q9) a) For following Expression **[8]**

(a+b)-(c-(d+e))

i) Construct Three address code.

ii) Construct an Expression Tree for above three address code

iii) Label the nodes of your expression with Sethi-Ullman Algorithm

iv) Generate optimal code with two registers from labeled expression tree.

b) With suitable example explain following terms **[8]**

i) Basic Block

ii) Flow Graph

iii) Peephole Optimization

iv) Call Graph

OR

Q10) a) Explain Sethi-Ullman algorithm for code generation. **[8]**

b) Write an algorithm for constructing DAG for the following basic block statements. **[8]**

i) t1 = 4 * i

ii) t2 = a[t1]

iii) t3 = 4 * i

iv) t4 = b[t3]

v) t5 = t2 * t4

vi) t6 = P + t5

vii) P = t6

viii) t7 = i+1

ix) i = t7

x) if i<20 goto (1).

Q11) For the above three address statements (Q.10b) if last statement is : if i<20 goto (6), Computer basic blocks, draw the flow graph, eliminate induction variables and draw modified flow graph. **[16]**

OR

Q12) For the following code segment computer **[16]**

a) Three address code.

b) Basic Blocks

c) Generate GEN and KILL Vectors for each block

d) Generate In and Out vectors for each block

i = m –1;

j = n;

a = u1;

do

    i = i + 1;

    j = j - l;

    if e3 then

        a = u2;

    else

        i = u3;

    end

while e2

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P 598   **[4064] - 588**

B.E. (Computer Engineering)
Image Processing
(2008 Course) (410444(A)) (Sem. - I) (Elective - I)

Time : 3 Hours]   *[Max Marks : 100*

Instructions to candidates :

1) *Answer three questions from each section.*
2) *Answers to the two sections should be written in separate books.*
3) *Neat Diagrams must be drawn wherever necessary.*
4) *Figures to the right indicate full marks.*
5) *Use of logarithmic tables slide rule, mollier charts electronic pocket calculator and steam tables is allowed.*
6) *Assume suitable data, if necessary.*

SECTION-I

Q1) a)   Explain the fundamental steps and component of image processing system.   **[8]**

b)   Write a note on Human Visual system.   **[8]**

OR

Q2) a)   What is digital image processing? Explain application of Image processing.   **[8]**

b)   Write a note on Digital Imaging Hardware and Software.   **[8]**

Q3) a)   Explain the steps involved in Image Digitization Process.   **[8]**

b)   List the main properties of a median filter. Compute the median value of the marked pixels shown in fig. using 3X3 mask.   **[8]**

$$\begin{pmatrix} 18 & 22 & 33 & 25 & 32 & 24 \\ 34 & \underline{128} & \underline{24} & \underline{172} & \underline{26} & 23 \\ 22 & 19 & 32 & 31 & 28 & 26 \end{pmatrix}$$

c)   What do you mean by aliasing in the context of image sampling?**[2]**

OR

Q4) a) Perform Histogram equalization of the following image. **[8]**

$$\begin{pmatrix} 4 & 4 & 4 & 4 & 4 \\ 3 & 4 & 5 & 4 & 3 \\ 3 & 5 & 5 & 5 & 3 \\ 3 & 4 & 5 & 4 & 3 \\ 4 & 4 & 4 & 4 & 4 \end{pmatrix}$$

b) Explain Non-linear gray-level transformation. **[8]**

c) What is unsharp masking? **[2]**

Q5) a) What is image segmentation? Explain the basic approaches for segmenting an image? Explain in detail Region Splitting and Merging for Image segmentation. **[8]**

b) What are meant by global, local and adaptive thresholds? What approach of thresholding should be used in case of nonuniform illumination? How do the gradient and laplacian operators help in threshold detection? **[8]**

OR

Q6) a) Explain techniques for identification of isolated points, lines and edges with respect to image segmentation. **[8]**

b) What is the difference between a line and an edge? Why second derivative operation is not normally used for edge detection? What is the advantage of sobel operator over prewitt operator? **[8]**

SECTION-II

Q7) a) With respect to following point explain wiener filter **[8]**

i) What is the advantage of wiener filter over inverse filter?

ii) What is the drawback of wiener filter? Under what condition wiener filter and inverse filters become identical?

b) What is image restoration? Explain the different ways for estimation of degradation model. **[8]**

OR

Q8) a) Explain Image degradation and restoration model. **[6]**

b) Write a short note on: **[10]**

i) Blind Deconvolution.

ii) Noise Models.

Q9) a) What is texture? Explain statistical and spectral descriptor. **[6]**

b) Give the 8-directional chain code and shape number for the arbitrary shape shown in fig. **[6]**
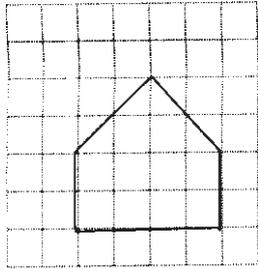
Aribitrary shape.

c) What is the need for Image compression? Explain redundancy in images. Explain Image-compression scheme. **[6]**

OR

Q10) a) Calculate the efficiency of Huffman code for the following symbol whose probability of occurrence is given below: **[8]**

Symbol	Probability
A1	0.9
A2	0.06
A3	0.02
A4	0.02

b) Explain different object representation and description techniques? **[6]**

c) What is run length coding? Explain with example. **[4]**

Q11) a) Explain the need of wavelet transform in image processing. Explain the different image processing application using wavelet transform. **[8]**

b) Explain JPEG2000 compression standard. **[8]**

OR

Q12) a) Explain Principal Component Analysis for dimension reduction. **[8]**

b) Write a short note on: **[8]**

    i) Case study on Iris recognition.
    ii) Image Pyramids.

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P 603   **[4064] - 593**

B.E. (Computer)
MOBILE COMPUTING
(2008 Course) (410445(B)) (Sem. - I) (Elective-II)

Time : 3 Hours]   *[Max Marks : 100*

Instructions to candidates :

   1)   Answer 3 questions from section-I and 3 from section-II.

   2)   Answers to the two sections should be written in separate books.

   3)   Neat Diagrams must be drawn wherever necessary.

SECTION-I

Q1) a)   Explain in detail GSM architecture system with diagram.   **[10]**

      b)   List, in order of importance, the operational requirement of GSM. **[6]**

OR

Q2) a)   Why VLR regarded as a distributed HLR? What particulars about mobile will you like to keep in the VLR database?   **[8]**

      b)   Narrate the distinction between the following service areas: **[8]**
           GSM, PLMN, MSC, LA and cells.

Q3) a)   What are the messages (information) transmitted over BCCH, FCCH and SCH? Justify why hopping cannot be used for these channels. **[8]**

      b)   What are the bursts signals used in GSM?   **[8]**

OR

Q4) a)   What do you mean by the rates of frame, multi frame and super frame?
                                                                             [8]

      b)   What are the TDMA standards and applications?   **[8]**

Q5) a)   Why initialization is necessary for mobile after the power is turned on?   **[8]**

      b)   Why is it necessary for the mobile to register in the system? Can one classify registration as a special case of location update?   **[10]**

OR

P.T.O.

Q6) a) Define the functions performed within the following procedures: **[10]**
 i) Identification.
 ii) Encryption and Ciphering.
 iii) Call clearing.
 iv) IMSI attach and detach.
 v) Location update.

 b) Explain the concept "off-air call setup". What are the advantages of this scheme. **[8]**

SECTION-II

Q7) a) Why is it absolutely essential in the PIN number used? What is its main purpose? **[8]**

 b) Explain four different types of security services provided by GSM?**[8]**

OR

Q8) a) For what reason is the PIN number is used? What is its main purpose? **[8]**

 b) Why do you think the ciphering key Kc must differ from one call to another? **[8]**

Q9) a) Compare Spectrum efficiency of CDMA with TDMA. **[8]**

 b) Name the three classes of handover. What are the two modes of handover? **[8]**

OR

Q10) a) Differentiate CDMA and GSM. **[8]**

 b) Explain both the spread spectrum technologies. **[8]**

Q11) a) What is difference between connectionless and connection oriented signaling. **[8]**

 b) Enumerate the basic function of MM, CC, RR layers. Illustrate with some examples. **[10]**

OR

Q12) a) What is the main purpose of TMSI reallocation? **[8]**

 b) Show the complete message coding for: call confirmed, call proceeding, location updating request, channel release, and partial release. **[10]**

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P604   **[4064]-594**

B.E. (Computer Engineering)
EMBEDDED SYSTEMS
(Sem. - I) (2008 Course) (Elective - II) (410445 (C))

Time : 3 Hours]   [*Max. Marks : 100*

Instructions to the candidates:

1) Answers to the two sections should be written in separate answer books.

2) In section -I attempt: Q.No.1 or Q.No.2, Q.No.3 or Q.No.4, Q.No.5 or Q.No.6.
   In section -II attempt: Q.No.7 or Q.No.8, Q.No.9 or Q.No.10, Q.No.11 or Q.No.12.

3) Neat diagrams must be drawn wherever necessary.

4) Figures to the right indicate full marks.

5) Assume suitable data, if necessary.

SECTION - I

Q1) a) Which characteristics of an Embedded system make it different than a General purpose system?   **[6]**

   b) Explain different steps in Embedded system design process.   **[6]**

   c) Explain how embedded processor and Application Specific System processors are different than a general purpose processor.   **[6]**

OR

Q2) a) Which different types of processors can be used as GPP in an Embedded system? Mention applications for each.   **[6]**

   b) Discuss recent trends in Embedded systems.   **[6]**

   c) Draw a layered architecture of Embedded system. Discuss various components in the Embedded System.   **[6]**

Q3) a) Discuss various actions taken to reduce the power consumption in an embedded system.   **[8]**

   b) Draw the architecture of ARM7 core. How ARM9 family is different than ARM7?   **[8]**

OR

P.T.O.

Q4) a) It is required to design a real time robotic control system. For this application, select the appropriate processor based on
   i)   Instruction cycle time
   ii) Bus width
   iii) MIPS
   iv) On chip cache
   v)   On chip RAM/ROM **[6]**

b) Discuss different operating modes ARM7 processors. **[6]**

c) State few advanced architectural units in Processors. **[4]**

Q5) a) Compare RS232 and RS485 standards. **[4]**

b) Discuss USB protocol w.r.t. following points
   i)   Data transfer speed
   ii) Topology
   iii) Types of data transfer **[8]**

c) Which optical devices are commonly used in embedded systems? **[4]**

OR

Q6) a) Discuss different fields in the data frame of CAN bus protocol. What are the applications of CAN? **[8]**

b) Discuss the arbitration mechanism in I^2C in detail. **[6]**

c) What is the need of data converters in embedded systems? **[2]**

SECTION - II

Q7) a) Explain the process of converting an assembly program into a file for ROM image. **[6]**

b) How C++ is useful in embedded system programming? Also mention its disadvantages. **[6]**

c) What is In-Circuit-Emulator? Give details. **[6]**

OR

Q8) a) Explain the process of converting a C program into a file for ROM image. **[6]**

b) How cross compilers are different than compilers? **[4]**

c) With the help of neat diagram, explain software development cycle for embedded system. **[8]**

Q9) a) Compare the following scheduling models of RTOS, based on worst case latency:

   i)   Cooperative Round Robin
   ii) Cooperative ordered list
   iii) Cooperative Time slicing (rate monotonic)   **[6]**

   b) What are virtual device drivers? Explain.   **[6]**

   c) Differentiate between RTOS and embedded OS.   **[4]**

<div align="center">OR</div>

Q10) a) Explain the significance of task scheduling in RTOS. Also explain preemptive scheduling model used In RTOS.   **[10]**

   b) Name and explain in brief any three IPC mechanisms used for process synchronization.   **[3]**

   c) Name two advanced scheduling algorithms.   **[3]**

Q11) a) Explain digital camera with respect to hardware and software components.
                                                                     [8]

   b) Differentiate between soft real time operating system and hard real time operating system.   **[4]**

   c) Discuss different features of Micro C/OS-II. Which type of RTOS is it?
                                                                     [4]

<div align="center">OR</div>

Q12) a) Discuss different applications where VxWorks is used. Also list its features.   **[6]**

   b) Give details of hardware and software components of mobile phone.**[6]**

   c) Differentiate between RTOS and desktop OS based on the following points.
      i) Interrupt handling
      ii) Task scheduling   **[4]**

<div align="center">■■■</div>

P 605   **[4064] - 595**

B.E. (Computer Engineering)
SOFTWARE TESTING & QUALITY ASSURANCE
(2008 Course) (410445(D)) (Sem. - I) (Elective-II)

Time : 3 Hours]   *[Max Marks : 100*

Instructions to candidates :
  1) *Answers to the two sections should be written in separate answer books.*
  2) *Neat Diagram must be drawn wherever necessary.*
  3) *Figures to the right indicate full marks.*
  4) *Assume suitable data, if necessary.*

SECTION-I

Q1) a) Describe causes of Software Defects and explain with diagram Defects Life Cycle.   **[10]**

   b) What is testing? Why testing is necessary?   **[6]**

                              OR

Q2) a) Explain in brief the software testing life cycle.   **[8]**

   b) Describe in detail Test Plan. How to check defects in Test Plan & Test cases.   **[8]**

Q3) Write Short Notes on (any three):   **[18]**
   a) Black box testing**.**
   b) Negative Testing.
   c) Equivalence Partitioning Class.
   d) Boundary value analysis with an example.

                              OR

Q4) Write Short Notes on (any three):   **[18]**
   a) Domain Testing.
   b) Positive Testing.
   c) User Documentation Testing.
   d) Test case design for black box Testing.

Q5) a) Explain white box testing in detail with example. Describe the challenges in white box testing.   **[10]**

   b) Write short note on Mutation Testing.   **[6]**

Q6) a) Describe test case designs for white box testing. **[6]**

    b) Explain in brief about testing of Object Oriented Systems. **[6]**

    c) Explain in short data flow testing. **[4]**

SECTION-II

Q7) a) What is regression testing? Types of regression testing. When to do regression testing? **[8]**

    b) Explain different Measurement tools. **[8]**

OR

Q8) a) Explain activities related to software metrics which involves some degree of software measurement? **[8]**

    b) Describe Smoke, Sanity & Random Testing. **[8]**

Q9) a) Describe "Total Quality Management" (TQM) principles of continual improvement. **[8]**

    b) What are software Reviews? Explain in detail different types of Formal reviews & Informal reviews? **[8]**

OR

Q10) a) Explain ISO & briefly give the narration how we can improve the quality of the product using ISO. **[8]**

    b) What is Six Sigma Principle? How to apply Six Sigma to improve Customer satisfaction? **[8]**

Q11) Write Short note on (any three): **[18]**

    a) Automated Testing.

    b) Winrunner.

    c) Web app. Interface Testing.

    d) Validation Testing.

OR

Q12) Write Short note on (any three): **[18]**

    a) Manual Testing.

    b) Loadrunner.

    c) GUI Testing.

    d) Rational Robot.

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Total No. of Questions : 12]   [Total No. of Pages : 4

P432   **[4064]-60**

B.E. (Production)

PROCESS PLANNING AND TOOL SELECTION

(2003 Course) (411088) (Sem. - II)

Time : 3 Hours]   [*Max. Marks : 100*

Instructions to the candidates:

1) *Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6 questions from Section I and Q.7 or Q.8, Q.9 or Q.10, Q.11 or Q.12 questions from Section II.*
2) *Answer to the two sections should be written in separate books.*
3) *Neat diagrams must be drawn wherever necessary.*
4) *Figures to the right indicate full marks.*
5) *Use of electronic pocket calculator is allowed.*
6) *Assume suitable data, if necessary.*

SECTION - I

Q1) a) Explain the significance of effective communication in engineering industry?   **[4]**

   b) List the main responsibilities of the product engineer?   **[4]**

   c) Process engineering called as hub of organization. Explain.   **[8]**

OR

Q2) a) How are the various departments affected by process engineer's work. Explain in detail?   **[8]**

   b) List the main responsibilities of the process engineer.   **[4]**

   c) What is the role of market research department in product design?   **[4]**

Q3) a) What general characteristics of workpiece are established from the preliminary part print analysis?   **[8]**

   b) What are the two methods of dimensioning? Which method is normally preferred and why?   **[8]**

OR

Q4) a) How can the functional surfaces of product critical areas be identified from the part print?   **[8]**

P.T.O.

b) Define the terms Show it's symbol and indicate these as a geometric tolerance with a assumed datum surface:
   i)   Flatness
   ii) Parallelism
   iii) Roundness
   iv) Angularity   **[8]**

Q5) a) What are the design and process tolerance stack? Explain with example?
                                                                     [8]

   b) What is mechanical control? Why is it necessary?   **[8]**

                              OR

Q6) a) Explain why is it necessary to balance a tolerance chart? Where is most logical place to start the balancing of tolerance chart?   **[8]**

   b) Why the producing accuracy of a process must be known before the cost of arbitrary tolerance selection is estimated?   **[8]**

SECTION - II

Q7) a) What is leasing? Explain its advantages and disadvantages as compared to ownership.   **[8]**

   b) What are the various factors affecting on selection of tooling?   **[8]**

                              OR

Q8) a) What is the relationship between process selection and machine selection?**[8]**

   b) What is the difference between general purpose machine (GPM) and special purpose machine (SPM)?   **[8]**

Q9) a) What are the effects of material selection economic use and proper control on the process cost?   **[8]**

   b) How is variant computer aided process planning (CAPP) system operates?**[8]**

                              OR

Q10) a) How are the critical areas on the workpiece generally identified ? Distinguish between product critical and process critical areas.   **[8]**

   b) What is the role of expert system in generative computer aided process planning (CAPP) system?   **[8]**

Q11) Prepare the **operation routing sheet** with time estimate, process parameters and draw the **process pictures** for the **1500 nos. Tenon as given in figure 1** using general purpose machine tools in a process layout industry. Specify the various machine tools used for preparing the operation routing sheet and production rate per shift. **[20]**
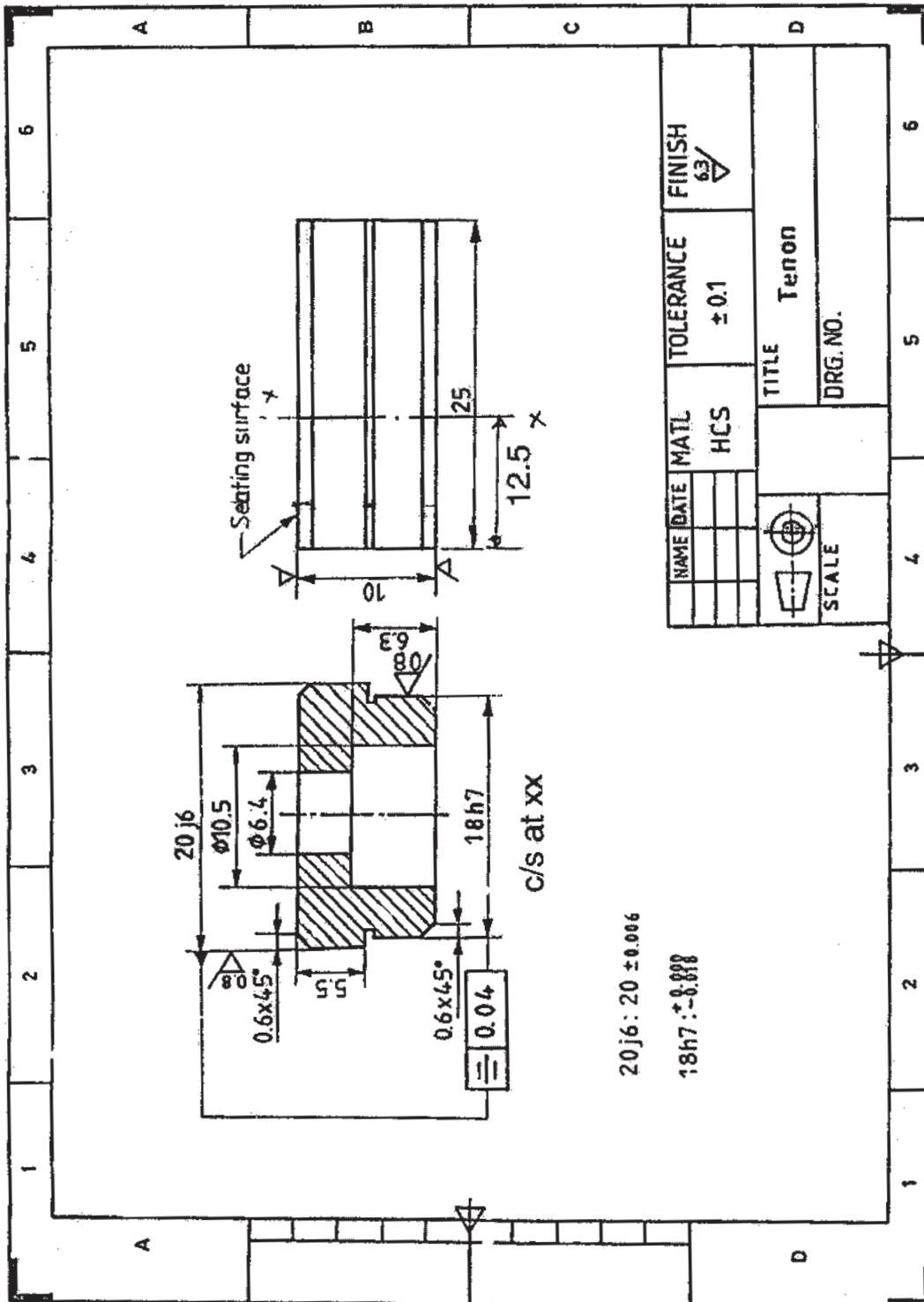
Figure –1
Tenon

OR

Q12) Prepare the operation routing sheet with time estimate, process parameters and draw the process pictures for the **1500 nos. Spacing piece as given in figure 2** using general purpose machine tools in a process layout industry. Specify the various machine tools used for preparing the operation routing sheet and production rate per shift. **[20]**

Figure – 2
Spacing Piece

∎∎∎
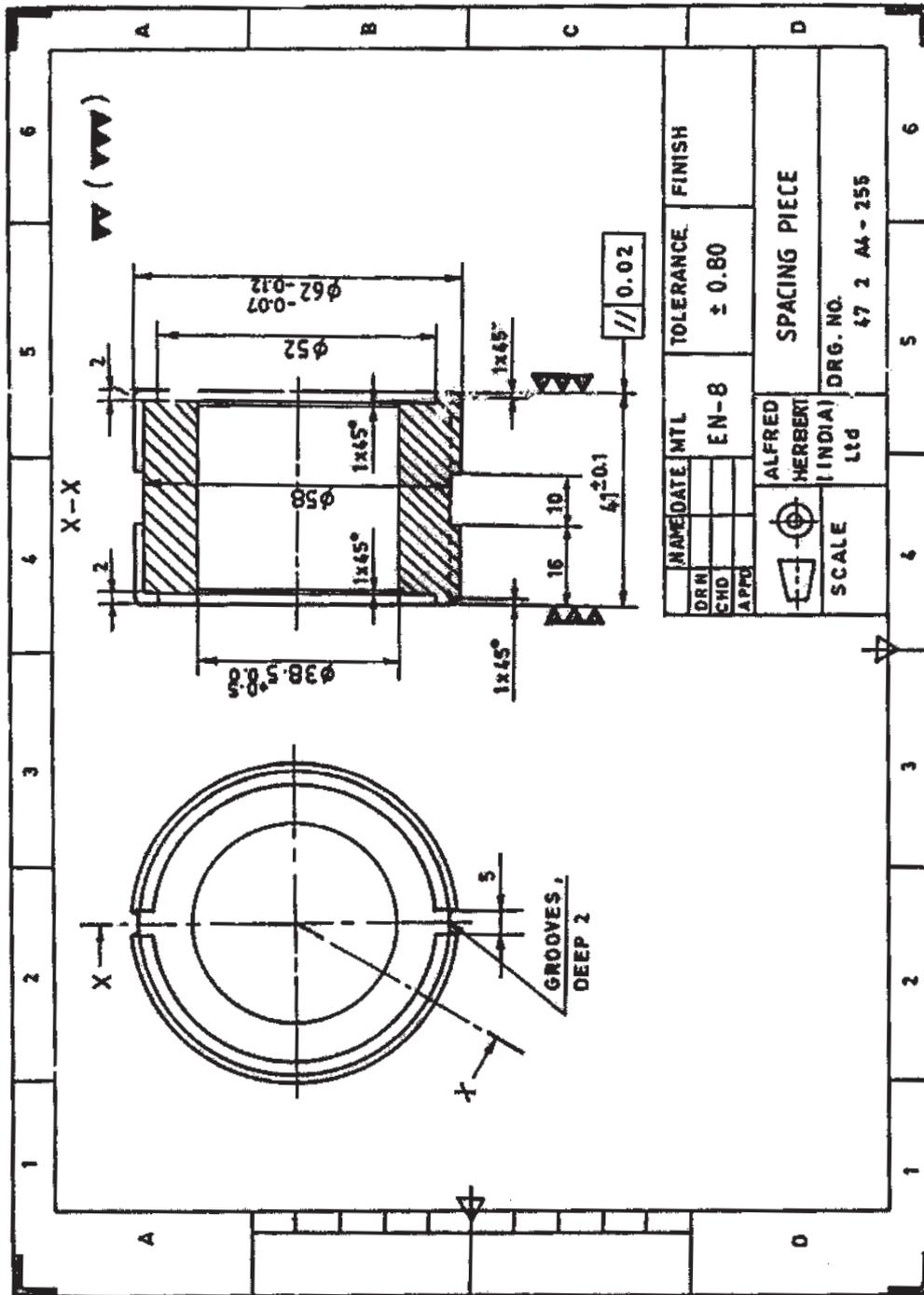
P607   **[4064]-603**

B.E. (IT)

SOFTWARE TESTING AND QUALITY ASSURANCE
(2008 Course) (414442) (Sem. - I)

Time : 3 Hours]   [*Max. Marks : 100*

Instructions to the candidates:
1)   *Answer question number 1 or 2, 3 or 4, 5 or 6 from section- I.*
2)   *Answer question number 7 or 8, 9 or 10, 11 from section- II.*
3)   *Answers to the two sections should be written in separate answer books.*
4)   *Neat diagrams must be drawn wherever necessary.*
5)   *Figures to the right indicate full marks.*
6)   *Assume suitable data, if necessary.*

SECTION - I

Q1) a) Define any four of the following terms.
  i)   Failure
  ii)   Faults
  iii) Test Bed
  iv)   Defects
  v)   Errors
  vi)   Software Quality.   **[8]**

  b) Differentiate between software verification and software validity.   **[8]**

OR

Q2) a) Explain in short any four methods of System Level Testing.   **[8]**

  b) Is complete testing possible? When to stop testing? Explain the difference between random testing and testing using error guessing.   **[8]**

Q3) a) Explain in detail different functions (responsibilities) to be handled in a testing life cycle or process.   **[8]**

  b) Explain with example Equivalence class partitioning and Boundary value analysis.   **[8]**

OR

P.T.O.

Q4) a) Describe the software defect life cycle. **[8]**

b) Draw control flow graph for the code given below. Clearly label each node so that it is linked to its corresponding statement. Calculate it's cyclomatic complexity. How can this value be used to measure testability? Describe how cyclomatic complexity number and the flow graph be used to design a set of white box tests for this module that would at least cover all its branches.

module foo () /* a[] and b[] are global variables*/ **[8]**
begin
int i, x
i=1
read(x)
while (i<x) do begin
a[i]=b[i] * x
if a[i] > 50 then
print ("array a is over the limit")
else
print ("ok")
i=i+1
end
print ("end of nonsense")
end.

Q5) a) Explain different types of measurement scales. **[6]**

b) Explain Product, Process and Resources with respect to their Internal and External attributes. **[8]**

c) Identify Questions and Metrics for the following Goal :- **[4]**
"Evaluate Effectiveness of coding standard"

OR

Q6) Spell-checker specification: "The checker accepts as input a document file and an optional personal dictionary file. The checker lists all words not contained in either of these files. The user can query the number of words processed and the number of spelling errors found at any stage during processing". **[18]**

Item	Weighting Factor		
	Simple	Average	Complex
External Inputs	3	4	6
External Outputs	4	5	7
External Inquiries	3	4	6
External Files	7	10	15
Logical Internal Files	5	7	10

It seams reasonable to assume that out of 14 factors, two factors has rating as 5 and six factors has rating as 3 and remaining six has rating as 0 on a scale of 0 to 5. Where 0 means irrelevant, 3 means it is average and 5 means it is essential to the system being built.

Based on the above perform the following:

a) Draw pictorial representation of the system.

b) Identify internal logical files, external I/P, O/P, Inquiries and Files.

c) Calculate Function Count (FC).

d) Calculate Technical Complexity Factor(TCF).

e) Calculate Function Point (FP).

f) Explain the use of FP.

SECTION - II

Q7) a) What does SQA ensure? What are the goals of SQA activity?   **[8]**

b) Write a note on :
   i)   Scatter diagrams
   ii) Cause and effect diagrams   **[10]**

OR

Q8) a) Explain following Software reliability Quality Attributes:
   i)   Correctness
   ii) Reliability
   iii) Usability
   iv) Integrity
   v)   Portability   **[10]**

b) Explain the following Quality concepts -
   i)   Quality
   ii) Quality Control
   iii) Quality Assurance
   iv) Cost of quality   **[8]**

Q9) a) Explain with example the six-sigma measure of software quality. **[8]**

b) List all the requirements of ISO 9000 and ISO 9001. **[8]**

OR

Q10) a) List and Explain Maturity Levels in the CMM. **[8]**

b) How is defect prevention and process change management brought into practice? **[8]**

Q11) Explain any four KPAs: **[16]**

a) Requirements Management (RM)

b) Software Project Tracking and Oversight (SPTO)

c) Software Configuration Management (SCM)

d) Organization process Definition (OPD)

e) Software Product Engineering (SPE)

f) Peer Reviews (PR).

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P 608   **[4064] - 604**

B.E. (IT)

ADVANCED DATABASE MANAGEMENT

(2008 Course) (414443(A)) (Sem. - I) (Elective - I)

Time : 3 Hours]   *[Max Marks : 100*

Instructions to candidates :

　　1)　Answers to the two sections should be written in separate books.

　　2)　Neat Diagrams must be drawn wherever necessary.

　　3)　Figures to the right indicate full marks.

　　4)　Assume suitable data if necessary.

　　5)　All questions are compulsory.

SECTION-I

Q1) a)　What is the need of PL/SQL? Draw PL/SQL block structure and execution environment. Explain each block.　**[8]**

　　　b)　How can you trap exceptions in PL/SQL? Write a code fragment to trap any three exceptions.　**[8]**

OR

Q2) Write an UPDATE trigger on a table that keeps track of old values of the updated record. Add old values in another table. Create required tables and write SQL statements for the same.　**[16]**

Q3) a)　What are TP monitors? Explain the TP-Monitor architectures.　**[8]**

　　　b)　What are two-phase locks? Give an example.　**[8]**

OR

Q4) a)　Write a note on long-duration transactions. What are the key properties they must have?　**[8]**

　　　b)　What are compensating transactions?　**[8]**

Q5) a)　Where you would need to use Complex data types? How would you declare structured types using SQL: 1999?　**[10]**

　　　b)　What is XML DTD? Explain with example.　**[8]**

P.T.O.

<center>OR</center>

Q6) a) Write a note on XML applications. **[8]**

b) In order to turn a language into database programming language, we need to make objects persistent. Explain different approaches. **[10]**

<center>**SECTION-II**</center>

Q7) a) Suppose that a data warehouse consists of three dimensions time, doctor and patient, and the two measures count and charge where charge is the fee that a doctor charges a patient for a visit. **[9]**

   i) Enumerate three classes of schemas that are popularly used for modeling data warehouse.

   ii) Draw a schema diagram for the above data warehouse using one of the schemas listed above.

b) Define data warehouse. Explain each clause in the definition. Can RDBMSes be used instead of warehouses? Give reasons. **[9]**

<center>OR</center>

Q8) a) What is the need of extraction, cleaning and transformation while building data warehouse? Give examples to support your answer. **[9]**

b) Describe how a dimensional model differs from an Entity-Relationship (ER) model present a diagrammatic representation of a typical star schema and state its advantages and disadvantages. **[9]**

Q9) a) What is market-basket analysis? Explain the algorithm that implements this concept. **[8]**

b) Explain in detail any four OLAP functions which are extensions to SQL. **[8]**

<center>OR</center>

Q10) Write short notes on: (any two) **[16]**

a) Categories of OLAP tools.

b) Supervised and unsupervised learning

c) OLAP benchmarks and applications.

Q11) a) Explain Implicit Locking. How does Oracle implement it? **[8]**

b) Write a note on Database Security and the threats. **[8]**

OR

Q12) a) How will you implement business rule validations? **[8]**

b) Explain the following in terms of providing security for a database: **[8]**

i) Authorization.

ii) Encryption.

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P 609   **[4064] - 607**

B.E. (IT)

ADVANCED OPERATING SYSTEMS

(Sem. - I) (414443) (D) (Elective - I) (2008 Course)

Time : 3 Hours]   *[Max Marks : 100*

Instructions to the candidates :

  1)   Answers to the two sections should be written in separate answer books.

  2)   Neat Diagrams must be drawn whenever necessary.

  3)   Figures to the right indicate full marks.

  4)   Assume suitable data, if necessary.

SECTION-I

Q1) a)   Why multiple queues are in process scheduling? Explain multilevel queue and multilevel queue with feedback scheduling.   **[8]**

   b)   What are advantages of named pipes over pipes with internal names? Are there any disadvantages.   **[6]**

   c)   Explain fork( ) system call with example.   **[4]**

OR

Q2) a)   Compare the concepts procedure call system call and context switch. How are they same and How are they different.   **[10]**

   b)   Explain following UNIX commands: **[8]**
      i)   Ifconfig.
      ii)   Mount.
      iii) Useradd.
      iv)   Chmod.

Q3) a)   What is multitasking OS? Draw process state transitions in KMOS and explain state transitions.   **[8]**

   b)   Give functional specifications of send and receive operation in KMOS.**[8]**

OR

Q4) a)   Can a user process send a message to an interrupt mailbox? Analyze the resulting behaviour of KMOS and discuss whether this operation should be allowed or not what would be the use, if any, of sending messages to interrupt mailboxes?   **[8]**

   b)   Write structure of PCB in KMOS. Discuss use of fields in this PCB. **[8]**

P.T.O.

Q5) a) What is parallel programming? Write pseudo code for parallel matrix multiplication. **[8]**

b) State and explain different types of multiprocessor os. **[8]**

OR

Q6) a) Differentiate between a process and thread. **[4]**

b) Differentiate between logical and physical address space. **[4]**

c) What is race condition? Explain how race condition can be handled. **[8]**

SECTION-II

Q7) a) What are the different ways to deal with external fragmentation? Explain the technique used by linux to solve external fragmentation problem. **[10]**

b) What is a slab? Explain different components of slab allocator. **[8]**

OR

Q8) a) Explain noncontiguous memory allocation. **[8]**

b) Write pseudo 'C' code for Kmalloc ( ) and kfrce ( ) functions and explain their use. **[10]**

Q9) a) What is an I/O interface? Explain different types of I/O interfaces. **[8]**

b) What is cache coherency? Explain coherent and streaming DMA mappings. **[8]**

OR

Q10) a) Show different kernel components that are affected by a block device operation with suitable diagram and explain their role. **[8]**

b) Why I/O schedulars are called as elevators? Explain CFQ, Deadline and anticipatory elevator algorithms. **[8]**

Q11) a) Explain data structures for file memory mapping. **[8]**

b) Draw Inode structure of UNIX Inode and explain accessing file data blocks. **[8]**

OR

Q12) a) Describe security mechanisms in UNIX. **[8]**

b) What is VFS? Explain interaction of process and VFS objects. **[8]**

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P610   **[4064]-609**

B.E. - IT

MOBILE COMPUTING

(2008 Course) (Elective - II) (414444 (B)) (Sem. - I)

Time : 3 Hours]   [*Max. Marks : 100*

Instructions to the candidates:

1) *Answers to the two sections should be written in separate answer books.*
2) *Neat diagrams must be drawn wherever necessary.*
3) *Assume suitable data, if necessary.*

SECTION - I

Q1) a) Explain various generation of mobile communication system.   **[8]**

b) Explain in detail the concept of frequency reuse   **[8]**

OR

Q2) a) What is handoff mechanism? Explain any 4 handoff mechanisms.   **[8]**

b) What is cell splitting? Explain the two cell splitting methods with appropriate example.   **[8]**

Q3) Explain GSM in following respects: **[18]**

i) Architectural diagram and its explanation

ii) Traffic and control channel details

iii) Security mechanism

OR

Q4) Write short notes on :   **[18]**

i) HLR and VLR databases

ii) HLR failure restoration

iii) VLR overflow problem

Q5) a) Explain the strengths and value added services of SMS **[8]**

b) What is number portability? Explain the three kinds of number portability.**[8]**

<div align="center">OR</div>

Q6) a) Explain the service node approach and hot billing approach used in mobile prepaid service. **[8]**

b) Explain the procedure of International call set-up. **[8]**

SECTION - II

Q7) a) Explain how the GSM system can be upgraded to GPRS **[8]**

b) Explain WAP protocol stack. **[8]**

<div align="center">OR</div>

Q8) a) Explain GPRS transmission plane characteristics in detail. **[8]**

b) Compare W-CDMA and cdma-2000 in detail. **[8]**

Q9) a) Explain mobile IP in detail. **[8]**

b) Explain IPv6 in detail. **[8]**

<div align="center">OR</div>

Q10) a) Write a detailed note on MANET. **[8]**

b) Explain three important processes used in Mobile IP. **[8]**

Q11) Write short notes on : **[18]**
   i) Bluetooth protocol stack
   ii) Spread spectrum technology
   iii) RFiD

<div align="center">OR</div>

Q12) Write short notes on : **[18]**
   i) WLAN
   ii) Java card
   iii) Wi-Max

<div align="center">■ ■ ■</div>

P 1149   **[4064] - 613**

B.E. (Biotechnology)
BIOPROCESS EQUIPMENT DESIGN
(2008 Course) (415465) (Sem. - I)

Time : 3 Hours]   *[Max Marks : 100*

Instructions to candidates :

1)   Answer three questions from Section I and three questions from Section II.

2)   Answer to the two sections should be written in separate answer boooks.

3)   Draw neat diagrams whenever necessary.

4)   Figures to the right indicate full marks.

5)   Make necessary assumptions wherever required.

SECTION-I

Q1) a) Explain codes and standards used in design.   **[6]**

   b) Explain the generalized design process in detail.   **[6]**

   c) Draw and explain stress-strain curve for: **[6]**
      i)   Ductile material
      ii) Brittle material

OR

Q2) a) Define following mechanical properties of materials: **[6]**
      i)   Creep   ii)   Toughness
      iii) Elasticity   iv)   Resilience
      v)   Malleability   vi)   Plasticity

   b) Explain following theories of failure under static load: **[12]**
      i)   Maximun normal stress theory.
      ii) Maximum shear stress theory.
      iii) Maximum distortion energy.

Q3) a) Describe the design of plain head, shallow dished head, and hemispherical head with neat sketch.   **[8]**

   b) Discuss the material used for the construction of high pressure vessel. **[4]**

   c) A hydraulic pipe 7.5 cm internal diameter is to be operated at an internal pressure of 50kg/cm^2. Calculate the thickness of pipe if the stress must not exceed 240 kg/cm^2.   **[4]**

P.T.O.

OR

Q4) a) A vessel is to be designed to withstand an internal pressure of 150 MN/m². An Internal diameter of 30 cm is specified, and steel having yield point of 450 MN/ m² has been selected. Calculate the wall thickness required by the various theories with a factor of safety 1.5 and $\mu = 0.3$. **[12]**

b) Why it is necessary to consider the corrosion allowances while specifying the final thickness of the vessel? **[4]**

Q5) a) Calculate the diameter of a shaft used in agitation system. Torque acting over the Shaft is 115000 kg-cm, While bending moment acting over the shaft is equal to 34600 kg-cm². Ultimate tensile strength of shaft material is equal to 6900 kg/cm². Ultimate shear stress is 75% of ultimate tensile stress. Factor safety used is 6.0. **[8]**

b) Explain various types of jackets with neat sketches. **[8]**

OR

Q6) a) Comment on heat transfer in agitated vessel. **[8]**

b) What are the types of agitators? Explain each with a neat sketch. **[8]**

SECTION-II

Q7) a) Explain the operation, application and steps for the design of shell and tube heat exchanger. **[8]**

b) What is the function of baffles in a heat exchanger? Explain their classifications. **[4]**

c) Explain the classification and selection criteria of an evaporator system. **[6]**

OR

Q8) Design an exchanger to sub-cool condensate from a methanol condenser from 95ºC to 40ºC. Flow rate of methanol is 1,00,000 kg/hr. Brackish water (sea water) will be used as a coolant, with a temperature rise from 25ºC to 40ºC of an exchanger having 20mm O.D and 16mm I. D. steel tubes of 4.83m length. At a first estimate take an overall heat transfer

resistance coefficient as 600 W/m²°C and validate your design.

Given data:

Properties of brackish water (sea water) and methanol used are:

Property	Brackish water (sea water)	Methanol
Density (kg/m³)	995	750
Heat capacity (KJ/kg°C)	4.2	2.84

Fouling resistance = 5000 W/m²°C for methanol and for brackish water (sea water) = 3000 W/m²°C, Outside film coefficient = 2740 W/m²°C, Inside coefficient = 3812 W/m²°C. Thermal conductivity of steel tube = 50 W/m²°C, Correction factor (Ft) = 0.85, μ = 0.34, clearance = 68 mm. For tube side fluid jh = 3.3 × 10⁻³ and jf = 4.3 × 10⁻³ and for shell side fluid jf = 4 × 10⁻² and jh = 3.3 × 10⁻³. **[18]**

Q9) a) Explain the optimum sieve plate performance diagram. **[6]**

b) A sieve plate distillation column is used for certain operation. Calculate the plate efficiency using Van Winkle's correlation.

Given data:

Density of liquid = 925 kg/m³, Density of vapour = 1.35 kg/m³

Viscosity of liquid = 0.34 × 10⁻³Ns/m², Viscosity of vapour = 10 × 10⁻⁶ Ns/m²,

Liquid diffusivity (light key components) = 4.64 × 10⁻⁹ m²/s

Height of weir = 50mm, hole area = 0.038m²,

Total column cross sectional area = 0.5m², superficial vapour velocity = 1.62 m/s, liquid surface tension = 60 × 10⁻³ N/m. **[10]**

OR

Q10) a) Define following types of plate efficiency: **[9]**

i) Murphree plate

ii) Murphree point

iii) Overall plate (column)

b) Explain AIChE method for calculation of plate efficiency. **[7]**

Q11) a) Describe downstream processing operations used in fermentation processes. **[10]**

b) What are the types of cartridge filtration? Write down its applications in fermentation and cell culture. **[6]**

OR

Q12) a) Write short notes on: **[8]**

i) TFF system

ii) Validation of filter

b) Explain steam sterilization procedure in detail. **[8]**

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P1153 **[4064]-618**

B.E. (Biotechnology)

BIOMATERIALS

(2008 Course) (415462) (Elective - II) (Sem. - I)

Time : 3 Hours] [*Max. Marks : 100*

Instructions to the candidates:

   1)   *Answer any three questions from each section.*

   2)   *Answers to the two sections should be written in separate books.*

   3)   *Neat diagrams must be drawn wherever necessary.*

   4)   *Figures to the right indicate full marks.*

SECTION - I

Q1) a) What is shape memory polymer? Explain shape memory cycle in detail. **[6]**

    b) Explain general properties of materials used in biology. Discuss briefly different classes of materials used in biology. **[10]**

OR

Q2) List out three important types and properties of metals which are being used during implants. Discuss processing steps involved for typical metallic implant device with one example. **[16]**

Q3) Explain in detail along with properties and functions: **[16]**

    a) Porous materials

    b) Chitin and chitosan

    c) Dental implants

    d) Biodegradable plastics

OR

P.T.O.

Q4) A titanium dental implant was manufactured by the Biomatter company for the past 8 years. It performed clinically well. For economical reasons, manufacturing of the titanium device was outsourced to Metalsmed Inc. Early clinical results on this Metalsmed implant, supposedly identical to the Biomatter implant, suggested increased inflammation. How would you compare the surface chemistry and structure of these two devices to see if a difference that might account for the difference in clinical performance could be identified? Discuss all possibilities in detail. **[16]**

Q5) Explain structure with physical and chemical properties of polylactic acid. How method of synthesis differs from other common polymerization processes with a neat sketch detail out the synthesis procedure for the same. **[18]**

OR

Q6) a) Explain mass spectrometry and atomic forced microscopy for analysis of polymer structure. **[9]**

b) Draw a chemical structure and write a note on "Biomedical applications of pullulan". **[9]**

SECTION - II

Q7) Write a short note on: **[16]**

a) Membrane Bioreactors

b) Application of biocatalyst in biotransformation process.

c) Ceramics

d) Nanobiomaterials

OR

Q8) What is 'Biocatalyst'? How it works for production of polymer, aromatic precursors. Explain any one industrial application of biocatalyst with suitable example. **[16]**

Q9) a) Explain structure and properties of polyglycolide and polycaprolactone.**[8]**

b) What is PHA? Explain in detail fermentative production of polyhydroxyalkanoates along with its applications. **[10]**

OR

Q10) List out different medical fibers and biotextiles. Describe in detail manufacturing methods of medical fibers. Give types of fibers and selection criteria required for medical fibers. **[18]**

Q11) List the type of materials used in each of the following medical applications along with feasibility of materials for said applications. **[16]**

    a) Contact lenses

    b) Tissue engineering scaffold

    c) Skin repair

    d) Bone plates

<center>OR</center>

Q12) a) Explain hydrogel applications in medicine considering importance of swelling property. **[8]**

    b) How can we use stress-strain diagrams in selecting the most appropriate materials for orthopedic biomaterials. **[8]**

<center>■■■</center>

Total No. of Questions : 12]   [Total No. of Pages : 4

P1108   **[4064]-75**

B.E. Production (S/W)
DIE AND MOULD DESIGN
(Sem. - I) (2003 Course) (411122) (Elective - I)

Time : 3 Hours]   [*Max. Marks : 100*

Instructions to the candidates:

1) *From section -I solve Q. 1 or Q. 2, Q. 3 or Q. 4, Q. 5 or Q. 6 and from Section - II solve Q. 7 or Q. 8, Q. 9 or Q. 10, Q. 11 or Q. 12.*
2) *Answers to the two sections should be written in separate answer books.*
3) *Neat diagrams must be drawn wherever necessary.*
4) *Figures to the right indicate full marks.*
5) *Use of electronic pocket calculator is allowed.*
6) *Assume suitable data, if necessary.*

SECTION - I

Q1) a) State true or false with justification:

      i)   Friction is essential during rolling process.

      ii)   Rolling load can be decreased by increasing roll diameter.   **[6]**

   b) Explain how the seamless tubes are manufactured with extrusion process.
                                                              [6]

   c) Explain the roll pass sequence for any structural shape of rolling product with neat sketch.   **[4]**

OR

Q2) a) Explain the following terms:

      i)   CCD.

      ii)   Shear factor.

      iii)   Extrusion ratio.

      iv)   Hooker's process.   **[8]**

P.T.O.

b) Determine the maximum reduction possible in wire drawing, tube drawing and strip drawing assuming following data,

Die angle = 30°

Plug angle = 20°

Coefficient of friction, $\mu = 0.1$ **[8]**

Q3) a) Explain different types of die set with neat sketch. **[8]**

b) What is stripper? What are the functions of stripper? Explain with neat sketch type of stripper used in press work. **[8]**

OR

Q4) a) Explain difference between compound and combination die with neat sketch. **[8]**

b) What is C.P. ? Find it for the blank shown in fig.1. **[8]**

Q5) Design a blanking die to produce a component as shown in fig. 1.

i) Draw strip layout and find out material utilization.

Given: Sheet size = 2500mm × 1259mm × 1.22mm thick

Shear strength of material = 195 MPa. **[4]**

ii) Find out cutting force if full shear is given. **[4]**

iii) Design and draw die. **[3]**

iv) Design and draw punch plate. **[3]**

v) Draw press tool assembly drawing. **[4]**
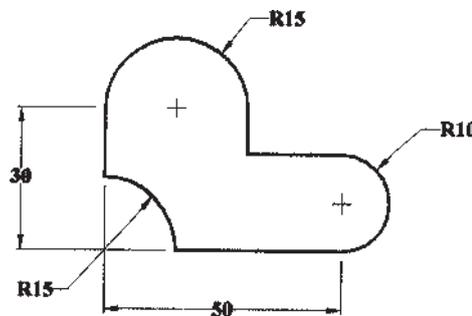
Fig: 1

OR

Q6) Design a progressive die for the component shown in Fig.4.

Given: Stock thickness=2mm, Shear strength of material= 195 MPa.

  i)   Draw strip layout and find material utilization   **[4]**

  ii) Find press tonnage   **[3]**

  iii) Design die block   **[3]**

  iv) Design and draw pilot and show its mounting   **[3]**

  v)   Draw assembly drawing of press tool (Die plan and front view).   **[5]**
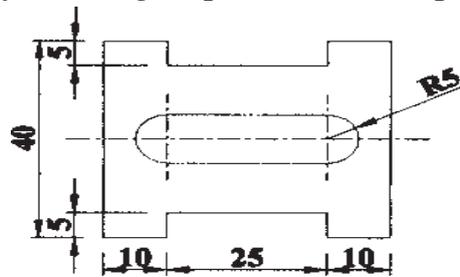
Fig: 4
Material: Al, 2mm thick

SECTION - II

Q7) a) Design finish impression for closed die forging of a component shown in fig. 5.
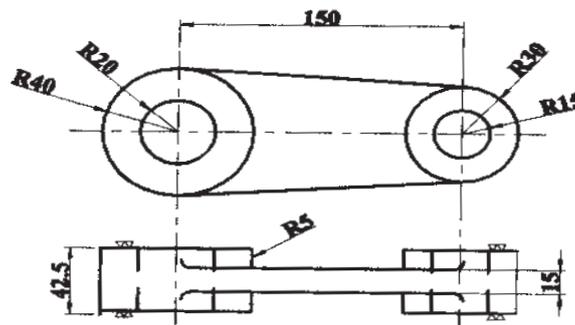
Fig:-5

                                                                        [8]

  b) What is upsetting? And what are the components formed by upsetting? And with any one of the component explain the rules of upsetting. **[8]**

                                    OR

Q8) a) What do you mean by fullering, edging, blocking and trimming in forging?   **[8]**

  b) Write short note on any two:

  i)   Open die and close die forging

  ii) PM forging.

  iii) Cleaning of forging.   **[8]**

Q9) a) Explain basic terminology in injection moulding. **[6]**

b) Write short note on:

i) Injection mould for thermosetting plastic.

ii) Blow moulding. **[10]**

OR

Q10) a) What is mean by bolster? What are their functions? What are its different types explain with neat sketch? **[8]**

b) What is local insert? And when it will be used? **[4]**

c) Explain the function of sprue bush and register ring with sketch. **[4]**

Q11) Design single impression injection mold for the plastic glass shown in figure 6.
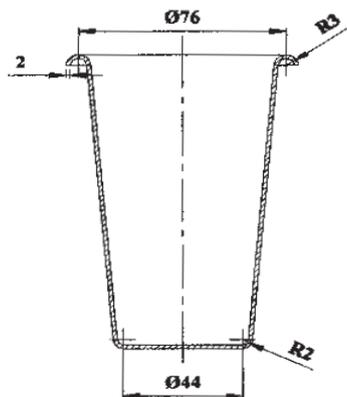
Fig. 6:Plastic Glass (*sectional view*)

[18]

OR

Q12) a) Explain different methods of mould cooling in injection moulding. **[8]**

b) What is gate? What are their functions? Explain different types of gate with neat sketch. **[10]**

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P 1219   **[4064] - 58**

B.E. (Production)

MATERIAL HANDLING TECHNOLOGY AND EQUIPMENT DESIGN

(2003 Course) (411085) (Sem. - I) (Elective - I)

Time : 3 Hours]   *[Max Marks : 100*

Instructions to candidates :

1)   Answer any Three questions from each section.

2)   Answer Q. No. 1 or Q.No. 2, Q.No. 3or Q.No.4, Q. No.5 or Q. No. 6 from section - I and answer Q. No. 7 or Q. No. 8, Q. No. 9 or Q. No. 10, Q.N. 11or Q. No. 12 from section - II.

3)   Answers to the Two sections should be written in separate answer books.

4)   Neat diagrams must be drawn wherever necessary.

5)   Figures to the right indicate full marks.

6)   Use of electronic pocket calculator is allowed.

7)   Assume suitable data, if necessary.

SECTION-I

Q1) a)   Explain the importance of material handling system in any production system.   **[8]**

b)   What are the factors considered while selecting of a material handling system?   **[8]**

OR

Q2) a)   Explain systematic handling analysis with a proper example.   **[10]**

b)   Explain unit load concept with a proper example.   **[6]**

Q3) a)   Briefly explain the objectives of material handling system.   **[4]**

b)   How material handling equipments are classified?   **[6]**

c)   What do you mean by material handling accessories? Explain properly.
                                                                                    [6]

OR

Q4) a)   Explain the following terms used in material handling system. (any two):   **[6]**

i)   Area Restricted

ii)   Position Restricted

iii) Unrestricted

b)   Explain any 5 principles used in material handling.   **[10]**

P.T.O.

Q5) a) What are the design considerations considered in Belt & Roller Conveyors. **[10]**

b) Which are the factors considered in selecting an equipment? **[4]**

c) Explain chain conveyor system used in material handling. **[4]**

OR

Q6) a) Explain the concept of fork lift truck & what are its advantages? **[8]**

b) Why one should use overhead cranes in material handling system? And list out its advantages. **[5]**

c) Differentiate Hydraulic conveying system from Pneumatic conveying system used in material handling equipment. **[5]**

SECTION-II

Q7) a) What is 'automation' and how it is useful in material handling equipment? **[8]**

b) Explain hydraulic drive used in material handling with neat diagram **[8]**

OR

Q8) a) Explain the design considerations to be considered for bulk material handling and unit load handling. **[10]**

b) List out the advantages of Automated Material Handling system. **[6]**

Q9) a) Briefly explain ASRS (Automatic Storage and Retrieval System). **[4]**

b) What is adaptive control system? Explain properly. **[6]**

c) Explain vision system used in material handling system. **[6]**

OR

Q10) a) Explain different types of AGV'S (Automated Guided Vehicles) **[6]**

b) What are AGV'S (Automated Guided Vehicles) and explain properly its principle of working. **[10]**

Q11) a) Explain the role of computers in material handling and packaging with neat examples. **[10]**

b) What is Automatic Identification Systems? **[4]**

c) List out the safety aspects to be considered while operating a material handling equipment. **[4]**

OR

Q12) a)   What are the environmental factors to be considered while designing equipment? **[8]**

b)   What are the human factors to be considered while operating a material handling equipment? Explain with at least two proper examples.**[10]**

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P 434   **[4064] - 76**

B.E. (Production S/W)

ADVANCED PRODUCTION TECHNOLOGY

(Sem - I) (Elective-I) (2003 Course) (411122)

Time : 3 Hours]   *[Max Marks : 100*

Instructions to candidates :

1) *Answers to the Two sections should be written in separate books.*

2) *Answer Three questions from each section.*

3) *Neat diagrams must be drawn wherever necessary.*

4) *Assume suitable data if necessary.*

SECTION-I

Q1) State the basic frame work of 'Toyota Production system'. Explain the different Systems and Methods used in TPS.   **[18]**

OR

Q2) a)   Explain in detail the KANBAN system.   **[8]**

b)   Discuss the following in TPS: **[10]**

i)   Production Smoothening

ii)   Shortening Lead Times

Q3) Define and Explain the 'Benchmarking Process'.   **[16]**
List the following of Benchmarking:

a)   Levels

b)   Types

c)   Benefits

OR

Q4) a)   Explain (any two):   **[16]**

i)   Business Process Reengineering

ii)   Value Stream Mapping

iii)   Single Minute Exchange of Die

Q5) State the various models of Productivity Measurement. Explain and Compare them. **[16]**

OR

Q6) a) State the objectives of Productivity Management. **[6]**

b) Explain the Concept, various models and methodology of Performance objectives-Productivity (PO-P). **[10]**

SECTION-II

Q7) a) What is Simulation? How it is useful in manufacturing industry? **[9]**

b) What are the various types of Simulations? Explain. **[9]**

OR

Q8) a) Define Artificial Intelligence. Explain the task domains of it. **[9]**

b) Explain the forward and backward chaining in Artificial Intelligence with suitable example. **[9]**

Q9) State the prime characteristic attributes of the products on which its design is based. Explain each of them. **[16]**

OR

Q10) Explain: **[16]**

a) Design Synthesis

b) Morphology of Design

Q11) a) Define Technology. Discuss its levels of development. **[8]**

b) Explain Evolution & Diffusion of Technology. **[8]**

OR

Q12) a) What are the strategic considerations of Management of Technology? Explain. **[8]**

b) Explain the role of Technology Management in recent manufacturing trends. **[8]**

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P 435   **[4064] - 78**

B.E. (Production S/W)
SUPPLY CHAIN MANAGEMENT
(Sem - I) (2003 Course) (Elective-II) (411125)

Time : 3 Hours]   *[Max Marks : 100*

Instructions to candidates :

1) *Answer Q1 or Q2, Q3 or Q4, Q5 or Q6 from section-I and Q7 or Q8,Q9or Q10, Q11 or Q 12 from Section-II.*

2) *Answers to the two sections should be written in separate books.*

3) *Neat diagrams must be drawn wherever necessary.*

4) *Figures to the right indicate full marks.*

5) *Assume suitable data if necessary.*

6) *Use of logarithmic tables, slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.*

SECTION-I

Unit - I

Q1) a) Identify cycles & push-pull boundary in supply chain when you are purchasing **SONY LCD TV** from a shop in your city. **[9]**

     b) Discuss the phases in decision supply chain. **[9]**

OR

Q2) a) Explain the process of understanding the customer and supply chain uncertainty. **[9]**

     b) Discuss the roll of 'sourcing' in supply chain & list the sourcing related Metrics (performance measures). **[9]**

Unit - II

Q3) a) Discuss the procedure of forecasting the demand. **[7]**

     b) What are the different methods of forecasting? Discuss them briefly. **[9]**

OR

Q4) a) Discuss the aggregate planning problems. Which information is needed for an aggregate planner? Which decisions are based on this information? **[10]**

     b) What is adaptive forecasting? Discuss the steps involved in it. **[6]**

P.T.O.

Unit - III

Q5) a) When the quantity discounts are justified in a supply chain? **[8]**

Differentiate between lot size based and volume based quantity discounts

b) What is the product availability? How it is measured? Describe two types of replenishment policies. **[8]**

OR

Q6) a) How the postponement of product differentiation can be used to improve supply chain profitability. **[8]**

b) What is the roll of safety inventory in supply chain? How the appropriate level of safety inventory is determined? **[8]**

SECTION-II

Unit - IV

Q7) a) Discuss the roll of transportation in supply chain. Mention the various modes of transportation with their strengths and weaknesses. **[9]**

b) Discuss the importance of information and information technology in supply chain. **[8]**

OR

Q8) a) List out various factors influencing Network design in supply chain. How the exchange rates & import duties affect the location decision in supply chain? **[9]**

b) Discuss the role of IT in forecasting and in inventory management. **[8]**

Unit - V

Q9) a) What is bull whip effect and how does it relate lack of coordination in supply chain? **[8]**

b) What are different CPFR scenarios and how do they benefit SC partners? **[9]**

<div align="center">**OR**</div>

Q10) a) Discuss the actions taken by Manager to overcome the obstacles and to achieve co-ordination in supply chain. **[8]**

b) How the design of distribution network in various types of industry has been affected due to evolution of E-business? **[9]**

<div align="center">**Unit - VI**</div>

Q11) a) What is role & importance of revenue Management in supply chain? **[8]**

b) Mention the ideas considered by Managers to make better Network design decisions under uncertainity. **[8]**

<div align="center">**OR**</div>

Q12) a) Changing the distribution network affects the supply chain cost. Discuss. **[8]**

b) What do you understand by 'Decision Tree'? Summarize basic steps in decision tree analysis. **[8]**

<div align="center">⌘⌘⌘</div>

P 614   **[4064] - 81**

B.E. (Electrical)

POWER SYSTEM OPERATION AND CONTROL

(2003 Course) (sem - I) (403141)

Time : 3 Hours]   *[Max Marks : 100*

Instructions to candidates :

    1)   *Answer any three questions from each section.*

    2)   *Answers to the two sections should be written in separate books.*

    3)   *Neat diagrams must be drawn wherever necessary.*

    4)   *Figures to the right indicate full marks.*

    5)   *Use of logarithmic tables, slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.*

SECTION-I

Q1) a)   Derive an expression for the critical clearing angle for a power system consisting of a single machine supplying to an infinite bus, for three phase short circuit fault occurred close to generator bus. **[8]**

    b)   Explain the equal area criterion used for the analysis of power system stability for the sudden rise in mechanical input. **[8]**

OR

Q2) a)   Explain 'Point by point method' for the solution of swing equation. **[8]**

    b)   Explain following terms: **[8]**

       i)   Steady state stability.

       ii)   Transient stability.

       iii)   Dynamic stability.

Q3) a)   What is the necessity of unit commitment? **[4]**

    b)   Explain various equality and inequality constraints used for unit commitment of thermal generating units. **[4]**

    c)   Explain with example, the 'priority list' method of unit commitment.**[8]**

P.T.O.

<center>OR</center>

Q4) a) Explain dynamic programming method for unit commitment. **[8]**

b) Discuss following terms: **[8]**
   i) Spinning reserve.
   ii) Must run time.
   iii) Shut down cost.
   iv) Start up cost.

Q5) a) Explain with neat block diagram, the load frequency control of an isolated power system. **[8]**

b) Explain the concept of 'Automatic Generation Control' **[2]**

c) Write short note on: **[8]**
   i) Speed governor dead band.
   ii) Generator rate constraint.

<center>OR</center>

Q6) a) Explain the concept of Area Control Error (ACE). With neat block diagram explain two area load frequency control. **[10]**

b) Explain steady state load frequency characteristic of a speed governor system. **[8]**

<center>**SECTION-II**</center>

Q7) a) Explain the concept of energy control center. Discuss centralized and decentralized control. **[8]**

b) Explain real time monitoring with functional block diagram. **[8]**

<center>OR</center>

Q8) With reference to energy control centers, explain following. **[16]**

a) Data logging unit.

b) Man-machine interface.

c) Remote terminal unit.

d) Telemetering.

e) State estimation.

Q9) a) What is the necessity of reactive power compensation in the power system? What are the different types of compensation? **[10]**

b) Explain series compensation. Also discuss the problems associated with series compensation. **[8]**

OR

Q10) a) Draw a typical loading capability curve of a generator. Explain the effect of variation of reactive power on the operation of synchronous generator. **[10]**

b) Explain the steady state performance of static V Ar compensation. **[8]**

Q11) Explain following terms: **[16]**

a) Energy banking.

b) Power pools.

c) Emergency power interchange.

d) Inadvertent power exchange.

OR

Q12) Explain: **[16]**

a) Economy interchange evaluation.

b) Interchange evaluation with unit commitment.

c) Capacity and diversity interchange.

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P437   **[4064]-83**

B.E. (Electrical)

INDUSTRIAL DRIVES & CONTROL

(2003 Course) (403144) (Sem. - I)

Time : 3 Hours]   [*Max. Marks : 100*

Instructions to the candidates:

　　1) *Answer three questions from section I and three questions from section II.*

　　2) *Answers to the two sections should be written in separate books.*

　　3) *Neat diagrams must be drawn wherever necessary.*

　　4) *Use of logarithmic tables slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.*

SECTION - I

Q1) a) What is an Electric drive? Discuss, essential parts of Electric Drive with the help block diagram. **[8]**

　　b) Write a brief note on, speed-torque characteristics of drive operated in all four quadrants. Use the example of hoist load. **[8]**

OR

Q2) a) What is drive? Explain different types of drives and procedure for selecting it. **[8]**

　　b) A ,motor is used to drive hoist. Motor characteristics are given by

Quadrant I & II = 200-0.2N N-m

Quadrant III & IV = -200-0.2N N-m

Where N is speed in rpm. When hoist is loaded the net load torque is T_l = 100N-m and when it is unloaded net load torque is T_l = -8-N-m. Obtain the equilibirium speeds for operations in all quadrants. **[8]**

Q3) a) Explain with neat circuit diagram dynamic braking of dc shunt motor. **[8]**

　　b) A 230V, 960 rpm and 200A d.c. separately excited motor has an armature resistance of 0.02 Ω.Motor is required to hold the rated load torque by dynamic braking at 1200 rpm without emf exceeding 230V. Calculate the value of external resistance to be added with armature. **[8]**

OR

P.T.O.

Q4) a) Explain plugging operation with respect to 3 phase Induction motor. Draw speed torque characteristic. **[8]**

b) What do you mean by braking while lowering the load? What is the objective of such braking. **[8]**

Q5) a) Draw circuit diagram of 3 phase fully controlled converter fed dc drive. Draw switching pulses, output voltage and current waveform. **[10]**

b) A 220V, 1500 rpm, 10A separately excited dc motor is fed from a single phase fully controlled rectifier with an ac source voltage of 230 V, 50Hz., Ra=2Ω. Conduction assumed to be continuous. Calculate firing angles for
   i) half the rated motor torque and 500 rpm
   ii) rated motor torque and -1000rpm. **[8]**

OR

Q6) a) Explain with neat circuit diagram modes of operation of dual converter. Draw output voltage and current waveforms if dc motor is controlled by dual converter. Also write voltage equation. **[10]**

b) Explain close loop control of dc motor. **[8]**

SECTION - II

Q7) a) State speed control methods of 3 phase Induction Motor. Explain any one method in detail. **[8]**

b) A 3 phase delta connected 6 pole, 50Hz, 400V, 925 rpm squirrel cage induction motor has the following parameters Rs=0.2, Rr'=0.3, Xs=0.5, Xr'=1. The motor is fed from voltage source inverter with a constant V/f ratio from 0 to 50 Hz and constant voltage of 400V above 50Hz frequency.
   i) Calculate speed for the frequency of 35Hz and half of full load torque.
   ii) Frequency and motor current for a speed of 600rpm and 80% of full load torque. **[8]**

OR

Q8) a) Explain different PWM technique used for control of induction motor. **[8]**

b) Compare CSI and VSI as applied to induction motor. **[8]**

Q9) a) Explain thermal model of motor for heating and cooling. **[8]**

b) Explain different classes of motor duty and how it affects the choice of selection of motor rating. **[8]**

OR

Q10) a) Explain how the variable speed drives allows saving of energy in pump drives. **[8]**

b) Explain with reasons energy loss in induction motor during starting. How it is saved. **[8]**

Q11) Write short notes on any three. **[18]**

a) Drives used in Sugar mill

b) Drives used in Textile mills

c) Drives used in Rolling mills

d) Drives used in machine tool application

e) Commutator less D.C. motor.

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P615   **[4064]-89**

B.E. (Electrical)
RESTRUCTURING AND DEREGULATION
(403143) (2003 Course) (Elective - I) (Sem. - I)

Time : 3 Hours]   [*Max. Marks : 100*

Instructions to the candidates:
   1)   Answer any three questions from each section.
   2)   Answers to the two sections should be written in separate answer books.
   3)   Neat diagrams must be drawn wherever necessary.
   4)   Figures to the right indicate full marks.
   5)   Use of electronic pocket calculator is allowed.
   6)   Assume suitable data, if necessary.

SECTION - I

Q1) a) Explain the integrated, monopolistic working of State Electricity Board prior deregulation.   **[8]**

   b) Explain functions of following institutions.   **[8]**

      i)   Planning Commission

      ii)   Central Electricity Authority

                              OR

Q2) a) Explain the objectives of 'Electricity Act 2003'. Also explain various national policies and guidelines under these acts.   **[8]**

   b) Explain the role of following   **[8]**

      i)   Ministry of Power

      ii)   Financing institutions

      iii) Power trading Corporation

P.T.O.

Q3) a) Explain following important concepts regarding economics of power sector : **[10]**

   i)   Capital cost

   ii) Debt and equity

   iii) Operation and maintenance cost

   iv) Fixed and variable cost

   v)   Life cycle cost

   b) Explain the concept of subsidy and cross-subsidy. **[6]**

<div align="center">OR</div>

Q4) a) State desirable characteristics of tariff. Also give factors governing the tariff structure. **[8]**

   b) Explain different methods to assess the financial feasibility of any project. **[8]**

Q5) a) Explain the role of 'public' in decision making of the regulatory process. **[4]**

   b) Explain the composition of regulatory commissions. **[6]**

   c) Explain functions of 'state' and 'central' electricity regulatory commission. **[8]**

<div align="center">OR</div>

Q6) Explain following methods of regulations.

   a) Rate of return regulation

   b) Performance based regulation

   c) Incentive regulation

   d) Benchmarking or Yardstick regulation **[18]**

<div align="center"><u>**SECTION - II**</u></div>

Q7) a) What are the models based on industry structure? Explain any two such models. **[8]**

   b) What are the models based on contractual arrangements? Explain any two such models. **[8]**

Q8) a) Explain international experience with electricity reform of Nordic Pool and UK. **[8]**

   b) Explain the California Energy Crisis. **[8]**

Q9) Write short note on following: **[16]**

   a) Rules that govern the electricity market.

   b) Peculiarity of electricity as a tradable commodity.

   c) Wheeling trading model.

   d) Integrated trading model.

OR

Q10) a) Explain retail access framework. Also explain the metering as well as accounting issues regarding retail competitive market. **[8]**

   b) Explain the impact of reform on regulation and externalities. **[8]**

Q11) a) State and explain various methods of transmission pricing. **[9]**

   b) Explain transmission congestion issues and management of transmission-congestion. **[9]**

OR

Q12) a) Explain the working of Independent System Operator (ISO) and Load Dispatch Center (LDC). **[9]**

   b) Explain the Availability Based Tariff and how it improved the grid discipline. **[9]**

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P1117

[4064]-423

B.E. (Mechanical)
MACHINE TOOL DESIGN
(2008 Course) (402045(B)) (Elective - II) (Sem. - I)

Time : 3 Hours]　　　　　　　　　　　　　　　　　　*[Max. Marks : 100*

Instructions to the candidates:
1) *Answers to both the sections should be written separately.*
2) *Use of non - programmable pocket calculator is allowed.*
3) *Use of mobile and other electronic gadgets are not allowed.*
4) *Assume suitable data, if necessary.*
5) *Figures to the right indicates marks.*
6) *Answers to the two sections should be written in separate books.*

SECTION - I

Q1) a) Explain anti friction nut-and-screw mechanism with the help of schematic diagram. **[10]**

b) Explain why speed and feed rate in machining operations needs to be regulated. **[8]**

OR

Q2) Find the speed steps arranged in geometric, harmonic and logarithmic progressions for the following conditions : n_{min}=12 rpm, n_{max}= 510 rpm, z = 8. **[18]**

Q3) a) A bed subjected to torsional loading is constructed as a closed box-type structure, while a bed subjected to bending is constructed as an I section. Justify with mathematical proof. **[8]**

b) Explain the design criteria for welded and cast bed. **[8]**

OR

Q4) a) Discuss the design considerations of machine tool structures. What methods are used for improving rigidity? **[8]**

b) Explain the effect of number of stiffners on the torsional rigidity of machine tool bed. **[8]**

Q5) a) Explain different shapes of slideways with neat sketch. **[8]**

b) Explain design criteria for slideways. **[8]**

OR

Q6) a) Discuss the methods of adjusting clearance on slideways. **[8]**

b) Write a short note on anti-friction guideways. **[8]**

SECTION - II

Q7) a) Derive the equation for total error in pitch of lead screw. **[10]**

b) What are the requirements of machine tool spindles. **[8]**

OR

Q8) a) Discuss in detail how optimization of spacing between spindle supports is achieved. **[9]**

b) Describe with a neat sketch, spindle unit of a milling machine (horizontal). Also show arrangements for power input to the spindle, and for power output to the arbour. **[9]**

Q9) a) Define dynamic rigidity of machine tools. Also explain the effect of damping factor, the ratio of exciting and natural frequencies on displacement ratio (Magnification factor) **[8]**

b) Explain adaptive control of machine tools. **[8]**

OR

Q10) a) Explain different methods of vibration control of machine tools. **[8]**

b) Explain various dynamic characteristics of the cutting process. **[8]**

Q11) a) Explain retrofitting with reference to an old Lathe unit. **[8]**

b) Explain with block diagram the principles of operation of a CNC machining center. **[8]**

OR

Q12) a) Explain design considerations for step - less drives. **[8]**

b) Take a brief review of recent trends in design of machine tools. State the merits and demerits of these trends with respect to conventional design process. **[8]**

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P1118

[4064]-425

B.E. (Mechanical S/W)
MACHINE AND COMPUTER AIDED DESIGN
(2008 Course) (Sem. - I) (402061)

Time : 4 Hours]   *[Max. Marks : 100*

Instructions to the candidates:

 1)   *Answer 3 questions from Section I and 3 questions from Section II.*

 2)   *Answers to the two sections should be written in separate books.*

 3)   *Neat diagrams must be drawn wherever necessary.*

 4)   *Figures to the right indicate full marks.*

 5)   *Use of logarithmic tables slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.*

 6)   *Assume suitable data, if necessary.*

SECTION - I
UNIT - I

Q1) a)   A 90° straight bevel gear pair is required to transmit 8 kW power from a shaft running at 200 rpm to an output shaft running at 120 rpm. Pinion with 21 teeth is made of steel with S_{ut} = 800 MPa while gear is made with steel with S_{ut} = 710 MPa. The starting torque of motor is 110% of running torque. Gear tooth system is 20° full depth involute. The gears are machined to grade 7. The deformation factor for gear pair is 10900×e N/mm. Design the gear pair with Buckingham equation for dynamic load and suggest the gear surface hardness. Assume factor of safety as 1.5.

For grade 7, $e = 11.0 + 0.9[m + 0.25\sqrt{d}], \mu m$ where d is mean diameter in mm.

Lewis form factor – $Y = 0.484 - \dfrac{2.87}{z'}$

Velocity factor $C_v = 5.6/(5.6 + v)$
First preference modules : 1, 1.25, 1.5, 2, 2.5, 3, 4, 5, 6, 8, 10, 12. **[12]**

  b)   Derive the expression for efficiency of a worm gear pair considering friction. **[4]**

OR

Q2) a) A worm gear pair 2/60/10/6 transmits 5 kW power from worm shaft rotating at 1440 r.p.m. to the gear shaft. The worm is left hand type and rotates in anticlock wise direction as viewed from right side. The coefficient of friction between worm and worm gear teeth is 0.05 and normal pressure angle is 20°. Determine. **[12]**

   i) Components of tooth forces acting on worm and worm gear.

   ii) The efficiency of gear pair.

   iii) Power lost in friction. If overall heat transfer coefficient is 18 W/m²⁰C and external surface area of the housing is 0.7 m², calculate temperature rise.

   b) Compare spiral bevel gears and hypoid gears with straight bevel gears. **[4]**

UNIT - II

Q3) a) A hydraulic cylinder with closed ends is made of plain carbon steel 15C8 (S_{ut} = 440 N/mm², S_{yt} = 240 N/mm²) with 300 mm inside diameter is subjected to internal pressure of 20 MPa. Using appropriate theory of failure, find the required thickness of cylinder with a factor of safety of 2. Assume Poisson's ratio = 0.3

   Derive the expression you use. **[12]**

   b) What is Autofrettage? Show the stress distribution in compound cylinders under working pressure. **[6]**

OR

Q4) a) A reaction vessel has a cylindrical shell with 1400 mm inside diameter and 20 mm thickness. It is provided with a nozzle of 300 mm inside diameter and 12 mm thickness. An inlet connection is provided at the nozzle and the extension of nozzle inside the vessel is 20 mm. Both vessel and nozzle are made of same material with yield strength as 210 N/mm² and design pressure is 3 MPa. Corrosion allowance is 2 mm and vessel is classified as class II vessel. Determine whether reinforcing pad is required for the vessel or not. If yes, determine the dimensions of reinforcing pad made out of 20 mm thick plate of the same material as that of vessel. Design a shallow dished head for the vessel and draw a neat sketch of the head and nozzle opening with dimensions. **[12]**

   b) Explain the types of supports for horizontal vessels. Briefly explain the design procedure for these supports. **[6]**

UNIT - III

Q5) a) A tension rod is subjected to an axial load within elastic limit. The strain in the rod is normally distributed variable with a mean of 0.001 mm/mm and a standard deviation of 0.00007 mm/mm. The modulus of elasticity is also normally distributed with a mean of 2.07×10^5 N/mm² and a standard deviation of 6000 N/mm².

Determine the mean and standard deviation of the corresponding stress variable σ. Comment on the analysis. **[10]**

b) Explain aesthetic and ergonomic considerations in the design of car steering wheel. **[6]**

<center>OR</center>

Q6) a) Explain basic principles of DFMA and elaborate these principles with the design considerations of worm gearbox casing. **[4]**

b) What are design and natural tolerances? **[2]**

c) A journal and bush assembly is manufactured as per the fit 40 H6-e7. Dimensions of journal and the bush are normally distributed and design tolerances are equal to natural tolerances. Determine the percentage of rejected assemblies if the maximum and minimum permissible clearances are to be 0.08 mm and 0.06 mm respectively. Tolerances for 40 H6-e7 fit are as follows.

Bush 40H6 : 40.000 to 40.016 mm

Journal 40e7 : 39.925 to 39.950 mm

Area from 0 to Z:

Z	1	1.4	1.8	2.0	2.2	2.4	3.0
Area	0.3413	0.4192	0.4641	0.4772	0.4861	0.4918	0.4987

[10]

<center>

SECTION - II
UNIT - IV

</center>

Q7) An inclined conveyor is used in transporting a mineral ore. The details of the conveyor are shown in Fig. 1. Use the following data :

- Capacity of the conveyor = 825 kg/hr
- Belt speed = 1.75 m/s
- Ore mass density = 1120 kg/m^3
- The flowability factor for inclined conveyor = 2.65×10^{-4}
- Mass of each idler = 23.1 kg
- Inclination angle with horizontal = 15°
- Friction factor for idlers = 0.025
- Snub factor for both snub pulleys = 0.03
- Snub factor for bend pulleys at take up = 0.04
- Snub factor for drive, tail and take up pulleys = 0.06
- Material velocity along the path of the belt = 0.5 m/s
- Angle of lap on drive pulley = 210°

- Coefficient of friction between belt and drive pulley = 0.45
- Ultimate tensile strength per unit width of ply = 80 N/mm
- Drive efficiency = 93%
- Pulley Diameter = 125 × number of ply
- Cleaning force = 30g B

(where B is the belt width in meters)

Standard Pulley Diameters : 315, 400, 500, 630, 800, 1000 mm

Standard Motor rating : 5, 5.5, 7.5, 10, 11, 12.5, 15, 20, 22, 25 kW

Standard Belt width :

Belt Width, B (mm)	400	500	650	800	1000
m_B (kg/m)	5	6.5	9	12	16

Determine :

a) A standard belt width.

b) A standard electric motor to run this conveyor.

c) The number of plies required for a factor of safety 20.

d) Select a standard pulley diameter.

e) Determine the counter weight in the gravity take up.
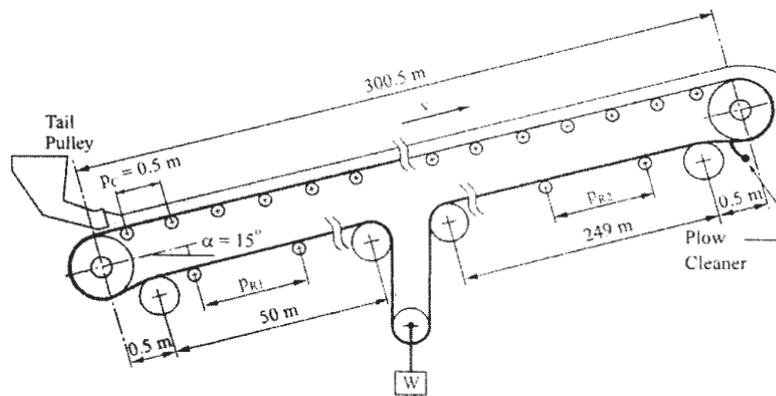
Fig.1 $p_c = 0.5m$
$p_{R1} = p_{R2} = 1m$ **[16]**

OR

Q8) a) What are desirable and undesirable effects in a design of a mechanical system? What are the objectives of optimum design? **[8]**

b) A cantilever beam of diameter 'd' and length 'L' is subjected to a vertical load 'P' at its free end. Outline the procedure of optimum design on the basis of maximizing strain energy absorbing capacity. **[8]**

UNIT - V

Q9) a) An axial stepped bar is as shown in Fig 2. It is subjected to an axial pull of 50kN. If the material of the bar is uniform and has a modulus of elasticity as 200 GPa, determine the displacement and stresses of each of the section, using one dimensional spar element. **[8]**
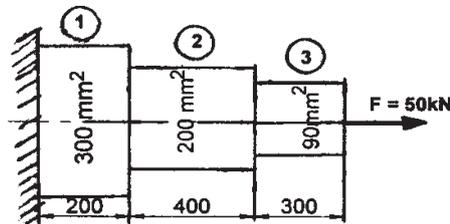
Fig.2

b) In Fig. 3, temperature at node 1 is 100° and at node 2 is 40°C. The length of the element shown is 200 mm. Evaluate the shape function associated with node 1 and node 2. Calculate the temperature at point 'P' situated at 150 mm from node 1. Assume a linear shape function. **[8]**
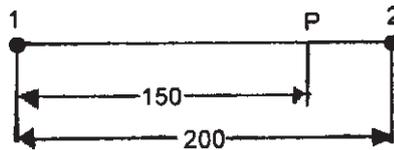
Fig.3

OR

Q10) a) A two member truss is as shown in Fig. 4. The cross sectional area of each member is 200 mm² and the modulus of elasticity is 200 GPa. Determine the deflection, reactions and stresses in each of the members. **[8]**
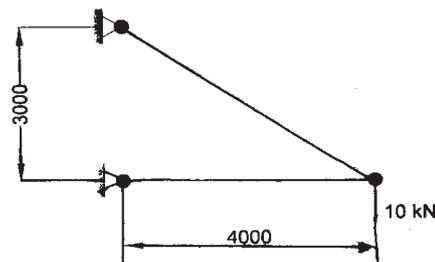
Fig.4

b) Evaluate the shape functions N_1, N_2 and N_3 at the interior point P for the triangular element shown in Fig. 5. **[8]**
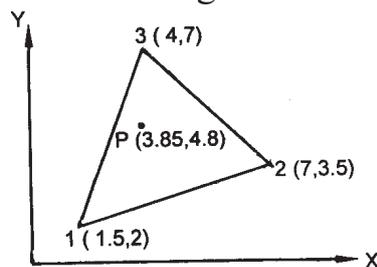
Fig.5

UNIT - VI

Q11) a) What are NC, CNC and DNC systems? Explain in detail. **[6]**

b) Write a manual part program for the component shown in Fig. 6. Assume the raw product as cast iron and the machining is to achieve the various dimensions. **[8]**
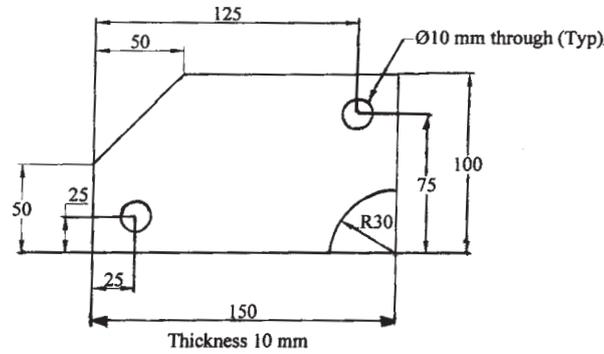
Fig.6

c) Explain Computer Integrated Manufacturing (CIM). **[4]**

OR

Q12) a) Explain different elements of Flexible Manufacturing Systems (FMS). **[8]**

b) Explain different types of automation. **[6]**

c) Write a manual program for drilling holes as shown in Fig. 7. The spindle is initially positioned at the lower left corner of the job. The actual drilling once positioned is achieved manually by the operator. **[4]**
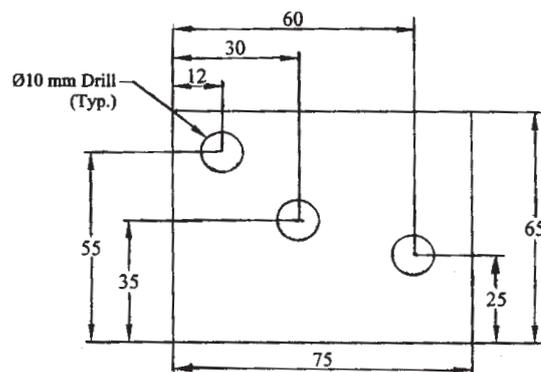
Fig.7

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P1119

[4064]-431

B.E. (Mechanical Sandwhich)
AUTOMOBILE ENGINEERING
(2008 Course) (Elective - III) (Sem. - I) (402064A)

Time : 3 Hours]   *[Max. Marks : 100*

Instructions to the candidates:
1) *Answer 3 questions from Section - I and 3 questions from Section - II.*
2) *Answers to the two sections should be written in separate books.*
3) *Neat diagrams must be drawn wherever necessary.*
4) *Figures to the right indicate full marks.*
5) *Use of electronic pocket calculator is allowed.*
6) *Assume suitable data, if necessary.*

SECTION - I

Q1) a) Show by line diagram how the drive is taken from the engine to the driving wheels for the following arrangements and explain clearly the advantages and disadvantages of each arrangement. **[8]**

    i) Front engine rear wheel drive.

    ii) Front engine front wheel drive.

  b) What are the various resistances to motion of vehicle? How do they affect power? Explain how power required by a vehicle while climbing a slope is calculated. **[8]**

OR

Q2) a) Compare the merits and demerits of the frameless construction with those of the conventional framed construction. **[8]**

  b) Discuss various styles of car bodies with suitable examples. **[4]**

  c) Explain clearly necessity of a transmission of vehicle. **[4]**

Q3) a) With the help of suitable diagram describes the construction features of diaphragm spring type clutch. Discuss its advantages and disadvantages relative to the clutch employing helical spring. **[6]**

  b) Draw a net sketch of constant mesh gear box. **[4]**

  c) Describe the operation of non slip or limited slip differential used in automobile. **[4]**

  d) What is a constant velocity joint? Explain in brief the principle and working of such joint. **[4]**

OR

Q4) a) Explain with the help of diagram the principle of any type of automatic transmission. **[6]**

b) Explain with the help of suitable sketch, the constructional features of clutch plates. **[6]**

c) What is an overdrive and why it is used in automobile? **[3]**

d) Distinguish between semi floating and full floating rear axle. **[3]**

Q5) a) What do you understand from the terms : oversteering, understeering, cornering power and slip angle? **[4]**

b) Describe in detail constructional features of the tubed and tubeless tyres for automotive use. **[4]**

c) Describe with the help of sketch operation of a 'Master cylinder' fitted in the braking system of a car. **[8]**

OR

Q6) a) Sketch a recirculating ball type steering gear and explain its working. **[6]**

b) What are the requirements of automobile air-conditioning system and how they are achieved. **[4]**

c) What are the advantages of air suspension system? **[3]**

d) What are the advantages and disadvantages of disc brakes? **[3]**

SECTION - II

Q7) a) Why is maintenance of an automotive vehicle necessary? What are different kinds of maintenance required for cars? **[8]**

b) Explain the Maintenance practices for **[10]**

   i) Braking system.

   ii) Steering system & Front Axle.

OR

Q8) Write short note on the following (any three) **[18]**

a) Antifreezing and Anticorrosive additives.

b) Tyre reconditioning

c) Wheel balancing.

d) Preventive maintenance of gear boxes and suspension system.

e) Causes and remedies of clutch system.

Q9) a) Explain the terms passive safety and active safety. List the instruments used in passive safety. Explain any two in short. **[8]**

b) Explain with the help of circuit diagram the Flasher unit used in lighting system. **[8]**

OR

Q10) a) Explain in detail the importance of ergonomics in automotive safety. **[8]**

b) What is Adoptive Front Lighting System (AFLS)? Explain its necessity and working. **[8]**

Q11) a) List the various types of sensors used in electronic control system of vehicle. Explain any two sensors used in induction system. **[8]**

b) Explain in detail electronic antilock braking system. **[8]**

OR

Q12) a) List the various types of actuators used in electronic control system of vehicle. Explain any two actuators. **[8]**

b) Explain with the help of block diagram the electronic engine control system used in automobiles. **[8]**

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P1120

[4064]-435

B.E. (Production)
MACHINE TOOL DESIGN
(2008 Course) (411081) (Sem. - I)

Time : 3 Hours]   *[Max. Marks : 100*

Instructions to the candidates:

1) *Attempt one question from each unit of Section I and Section II.*
2) *Answers to the two sections should be written in separate books.*
3) *Figures to the right indicate full marks.*
4) *Neat diagrams must be drawn wherever necessary.*
5) *Use of non - programmable electronic pocket calculator and statistical tables is allowed.*
6) *Assume suitable data, if necessary.*

SECTION - I
UNIT - I

Q1) a) What do you understand by kinematic structures in machine tools? **[4]**

b) A nine speed gear box is to be designed for the minimum speed of 100 rpm and maximum speed of 1600 rpm. It is to be driven by an induction motor rotating at 1440 rpm. Draw best structural diagram, optimum ray diagram and gear box layout. **[14]**

OR

Q2) a) Show that for geometric progression the useful value of speed ratio 'φ' lies between 1 & 2. Also prove that maximum loss of economic speed is constant in geometric progression. **[8]**

b) Deduce the expression for power in horizontal milling machine and show diagrammatically the forces acting on milling cutter during machining. **[10]**

UNIT - II

Q3) a) What are the important elements of machine tools? Explain their functioning and importance in the working of machine tools. **[8]**

b) Explain the concept of static and dynamic rigidity of machine tool and state the procedure for estimating them. **[8]**

OR

Q4) a) Give the comparative evaluation of machine tool structures on the basis of :**[10]**

i) Materials for machine tool structures.

ii) Frictional behavior under dry & lubricated condition.

iii) Profiles of machine tool structures.

b) Would it be possible to design and build machining and turning centers without the use of computer controls? Explain. **[6]**

P.T.O.

UNIT - III

Q5) a) Classify the various types of configuration of the guides used in machine tools, based on material, lubrication system, drives control etc. **[8]**

b) What is meant by a rigidity of a lubricated slide ways? Show that the rigidity of a hydrostatic slideway is 50% more than that of a hydrodynamic slideway. **[8]**

OR

Q6) a) Explain the specific merits and demerits of plastic guides commonly used in machine tools. Name some of the filled and unfilled plastic guides. **[8]**

b) Describe with neat sketches the various methods used for the compensation of wear of guides. **[8]**

SECTION - II
UNIT - IV

Q7) a) What are the basic consideration in designing the spindle unit supports and spindle ends in a high speed machine tools? Sketch unit supports and spindle ends in a high speed machine tools. **[10]**

b) Why it is essential to preload the bearings of spindle mountage? **[8]**

OR

Q8) a) Explain the working principle of recirculating ball screws commonly used in CNC versions. What are its special advantages? **[8]**

b) Explain with neat sketches the methods of backlash (pitch error) adjustment in sliding friction power screws. How do these errors affect the performance of the machine tool? **[10]**

UNIT - V

Q9) a) Why is damping of machine tools important? How is it accomplished? **[6]**

b) Write a note on dynamic characteristic of the cutting process. **[6]**

c) Why is thermal expansion of machine tool components important? **[4]**

OR

Q10) a) What do you understand by stick - slip motion? Explain with a suitable example. **[8]**

b) Describe the procedure followed in performing acceptance tests for machine tools. **[8]**

UNIT - VI

Q11) a) Explain the importance of aesthetics as a requirement in machine tool design with a suitable example. **[8]**

b) Explain the concept of ergonomics as applied to different parts of machine tool. **[8]**

OR

Q12) a) Discuss the modern trends in design of machine tools. **[8]**

b) Describe how CAD techniques can be applied in design of machine tool structures. **[8]**

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P1122

[4064]-455

B.E. (Production) (S/W)
FINANCIAL MANAGEMENT AND COST CONTROL
(Sem. - I) (2008 Course) (411125(C)) (Elective - II)

Time : 3 Hours]   *[Max. Marks : 100*

Instructions to the candidates:
  1) *Solve Q.1 or Q.2, Q.3 or Q.4, Q.5 is compulsory.*
  2) *Solve Q.6 or Q.7, Q.8 or Q.9, Q.10 is compulsory.*
  3) *Use of pocket calculator allowed. (Non Programmable)*

SECTION - I

Q1) A company has to make a choice between two projects viz. Project A which requires initial capital investment of Rs. 1,35,000 and Project B which requires initial capital investment of Rs. 2,40,000. There will be no scrap value at the end of the life of both the projects. The cost of capital of the company is @10%. The annual cash inflows are as follows

Year	Project A Rs.	Project B Rs.	Discounting factor @10%
1	NIL	60,000	0.9091
2	30,000	84,000	0.8264
3	1,32,000	96,000	0.7513
4	84,000	1,02,000	0.6830
5	84,000	90,000	0.6209

Calculate Pay - Back Period, Net Present Value and Profitability Index for both the projects. Which project will you accept? Why?   **[16]**

OR

Q2) Based on the following information furnished by Zed Private Ltd. Sales - Rs. 10,00,000 Consumption of Raw Material Rs. 3,50,000 Wages Rs. 1,00,000 Other Manufacturing expenses Rs. 1,00,000
Indirect Expenses - Rs. 2,50,000 cash in hand - RS 1,00,000 Creditors - Rs.3,00,000 Debtors - Rs. 2,00, 000 Stock of raw material Rs 2,00,000
Share Capital Rs. 2,00,000   **[16]**
Calculate

  a) Gross Profit Ratio.
  b) Net Profit Ratio.
  c) Current Ratio.
  d) Quick Ratio.
  e) Stock Turnover Ratio.

P.T.O.

Q3) a) Explain the concept and types of Working Capital. Discuss the factors affecting the amount of working capital. **[10]**

b) Explain the different sources of working capital in detail. **[6]**

OR

Q4) a) What are the goals of financial management? What do you mean by fun flow statement? **[8]**

b) Explain cost of capital & time value of money. **[8]**

Q5) Write short notes on. (Any Three) **[18]**

a) Share Capital

b) Reserves and Surplus.

c) Borrowed funds

d) Depreciation

SECTION - II

Q6) X Ltd. and Y Ltd. are competitors. During the year ended 31/12/2010, both the companies achieved a sales turnover of Rs. 5,00,000/- and earned a profit of Rs. 1,00,000/- The composition of Total cost for both the companies was as follows:

Particulars	X Ltd.	Y Ltd
Fixed Cost	Rs 2,00,000	Rs 1,00,000
Variable Cost	Rs 2,00,000	Rs 3,00,000

Calculate Break - Even point for both the companies.

Also calculate profit earned by both the companies if sales

a) Increase by Rs. 1,00,000

b) Decrease by Rs. 1,00,000

Give your comments. **[16]**

OR

Q7) a) What are the methods of costing? Explain the elements of cost. **[8]**

b) What are the principles of good remunering system? What is labour turnover & its methods. **[8]**

Q8) a) What do you mean by overhead? Explain its different types in detail with suitable example. **[8]**

b) What is budgetary control, cost control & cost reduction. **[8]**

Q9) a) What is cost reporting & what are its corrective actions? Explain standard cost. **[8]**

b) What are the elements of cost control programme? Explain project planning & scheduling in detail. **[8]**

Q10) Write Short notes on following (Any three) **[18]**

a) Break - Even Analysis.

b) Process Costing

c) Labour Turnover.

d) Cost of quality.

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P1123

[4064]-468

B.E. (Electrical)
EMBEDDED SYSTEM
(2008 Course) (Elective - II) (Sem. - I) (403144(B))

Time : 3 Hours]   *[Max. Marks : 100*

Instructions to the candidates:
   1) *Answer any 3 questions from each section.*
   2) *Answer 3 questions from Section I and 3 questions from Section II.*
   3) *Answers to the two sections should be written in separate books.*
   4) *Neat diagrams must be drawn wherever necessary.*
   5) *Figures to the right indicate full marks.*

SECTION - I

Q1) a) Define Embedded Systems & its applications.   **[4]**

   b) Explain in detail categories of embedded systems with definition and one example of each category.   **[4]**

   c) Explain overview of Embedded System Architecture with block diagram. **[6]**

   d) Explain Design Process in Embedded Systems with waterfall model.**[4]**

OR

Q2) a) What is digital signal processing processor, its application and architecture of any DSP processor family with block diagram?   **[6]**

   b) Explain characteristics and features, overview any one of the 8 - bit Atmel or Microchip Microcontroller.   **[6]**

   c) Differentiate between RISC and CISC processor with examples and explain the characteristics and features of ARM7 processor.   **[6]**

Q3) a) Explain ADC - Types, its microprocessor interfacing, clocked interfaces and serial interfaces with diagram.   **[8]**

   b) Explain Temperature sensors and their interfacing with microcontroller through ADC.   **[6]**

   c) List types of optical sensors.   **[2]**

OR

Q4) a) Explain interfacing of 4 × 4 matrix keypad to microcontroller with diagram.**[8]**

b) Explain solid - state motion sensor with diagram. **[4]**

c) Explain working of strain gauge with diagram. **[4]**

Q5) a) Define solenoids and relays. Explain microprocessor interfacing to Solenoids - Relay with diagram. **[6]**

b) What is LED ripple and how to prevent LED ripple problem. **[6]**

c) What is DACs and specialized DACs? **[4]**

OR

Q6) a) What are types of stepper motors? Explain bipolar versus unipolar operation of stepper motors. **[6]**

b) Explain stepper motor drive ICs (L62D1 & LM18200). **[4]**

c) Explain DC motor operation with different loads. **[6]**

SECTION - II

Q7) a) Explain Inter - process communication and synchronization of process, tasks and threads. **[8]**

b) What is interrupt latency? ISR? Interrupt recovery time? **[6]**

c) What is device driver and explain device drivers for embedded devices.**[4]**

OR

Q8) a) Explain in detail following scheduling algorithms. **[10]**
   i)   First in first out.
   ii)   Round robin
   iii) Round robin with priority
   iv)   Shortest job first
   v)   Non-preemptive multitasking.
   vi)   Preemptive multitasking

b) Explain the concept of semaphores with example. **[4]**

c) What is difference between mailbox and message queues? What is application of each? **[4]**

Q9) a) What is kernel? Explain architecture of kernel. **[8]**

b) Define RTOS. What is real time system? Name RTOS available? **[4]**

c) What do you mean by pipe and event register? **[4]**

OR

Q10) a) Explain timer functions of RTOS. **[4]**

b) What are differences between General purpose operating systems and RTOS? **[4]**

c) Explain the features of Vxworks RTOS. What are the application areas where it is used? **[8]**

Q11) a) Explain case study of an embedded system for a smart card. **[10]**

b) What are the special features needed for embedded software in smart card? **[6]**

OR

Q12) a) Explain Digital camera with functional block diagram. **[10]**

b) Design a control system for a prototype aircraft attitude control. **[6]**

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P1124

[4064]-475

B.E. (Electronics)
ELECTRONICS SYSTEM DESIGN
(Sem. - I) (2008 Course) (404201)

Time : 3 Hours]   *[Max. Marks : 100*

Instructions to the candidates:
    1)   *Answer 3 questions from Section I and 3 questions from Section II.*
    2)   *Answers to the two sections should be written in separate books.*
    3)   *Figures to the right indicate full marks.*
    4)   *Use of electronic pocket calculator is allowed.*
    5)   *Assume suitable data, if necessary.*

SECTION - I

Q1) a) Explain the Bathtub curve indicating all its regions. Also explain how failures are reduced in first and last region. **[8]**

b) Compare Consumer Products, Industrial products and Military products for - **[10]**

    i)   Cost/performance ratio

    ii)   Reliability

    iii)   Competition

    iv)   Temperature rating of components used

OR

Q2) a) Describe the steps involved in development of an electronic product that is required to be manufactured in large quantity. What is the importance of 'field trials' and environmental testing in product design cycle? **[10]**

b) Draw a complete frequency spectrum and show the band allocated for Broadcast of radio signals, also explain selection criteria for same band. **[8]**

Q3) a) Compare at least four types of ADCs with respect to parameters : - missing codes, differential and integral nonlinearity, aperture jitter, multiple inputs, resolution and power consumption. **[12]**

b) What is need of decoupling capacitor where it is located in the circuit? **[4]**

OR

Q4) a) Draw a circuit of instrumentation amplifier and carry out error budget analysis for its parameters slew rate, CMRR, bandwidth, offsets etc. **[10]**

b) Compare at least two DAC techniques with their selection criteria? **[6]**

Q5) a) Explain the different contact electrical switches and ways to reduce the key bounce **[8]**

b) Compare I/O buses used for instrumentation applications and also their selection criteria. **[8]**

OR

Q6) a) Explain designing of interface of LED and LCD to the microcontroller. **[8]**

b) What are different factors in selection of microcontrollers explain in detail. **[8]**

SECTION - II

Q7) a) What are features of cross compiler used for programming C51 microcontrollers. **[8]**

b) Explain ASM chart in detail. **[8]**

OR

Q8) Write short notes on- **[16]**

a) Modular programming.

b) In circuit emulator.

c) Standard methods of debugging software.

d) Steps from coding to the generation of executable code when using combination of Assembly language and C language programs.

Q9) Explain the PCB design considerations with respect to - **[16]**

a) Ground and V_{CC}/V_{DD} planes.

b) Analog and digital grounds.

c) Ground bounce

d) Impedance matching and termination scheme.

OR

Q10) a) Calculate the inductance of a PCB track having length of 10 cm and width 0.4 mm. Track thickness is 37 microns. Compare the inductance of track if its width is reduced to half. **[8]**

b) Two tracks on PCB laminate having thickness of 3.2 mm and $\varepsilon_r = 4.7$ have an overlapping area 4 cm². What will be capacitance between two tracks. **[4]**

c) Compare on - board and off - board regulation schemes for placement of DC regulated power supply. **[4]**

Q11) a) Draw a circuit of single stage MOSFET common source amplifier and perform DC and AC analysis. **[10]**

b) Explain the significance of following specifications of DSO- **[8]**

   i) Memory depth.

   ii) Sampling rate.

   iii) Bandwidth.

OR

Q12) a) Explain different types of tests carried out on product to confirm Electromagnetic Compatibility. **[9]**

b) Explain how simultaneous state and timing mode of Logic Analyzer helps in fault finding of high speed digital designs. **[9]**

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P1175

[4064]-505

B.E. (Instrumentation & Control)
PROCESS INSTRUMENTATION
(2008 Course) (Sem. - I) (406261)

Time : 3 Hours]   *[Max. Marks : 100*

Instructions to the candidates:

1)   *Answer three questions from section I & three questions from section - II*

2)   *Answer to the two sections should be written in separate books.*

3)   *Neat diagrams must be drawn wherever necessary.*

4)   *Figures to the right indicate full marks.*

5)   *Use of electronic pocket calculator is allowed.*

6)   *Assume suitable data, if necessary.*

SECTION - I

Q1) a) Clarify the following terms :   **[8]**

   i)   Time constant of a Process

   ii) Degrees of freedom

   b) Define Self - regulating process. Derive the first order differential equation for self - regulating process.   **[8]**

OR

Q2) a) Explain in brief Dead time or transport delay processes. Also discuss the effect of P action on Dead time dominant processes.   **[8]**

   b) Clarify the following terms :   **[8]**

   i)   Interacting & Non - interacting lags

   ii) Natural period of oscillation

Q3) a) Elaborate analysis of Liquid Level control system.   **[10]**

   b) Draw the Faceplate of SLPC. Also write down specifications of typical SLPC.   **[8**

OR

Q4) a) Apply Scaling & find out normalized (Scaled) equation for Heat Exchanger, following data is available : **[10]**

   i) Steam flow rate Ws = 0 to 3000 pounds per hour

   ii) Latent heat of steam Hs = 1010 Btu per pound.

   iii) Process fluid flow rate Wp = 0 to 24990 pounds per hour.

   iv) Specific heat of Process fluid Cp = 1 Btu per pound.

   v) Outlet Temperature T2 = 50 to 250° F

   vi) Outlet Temperature T1 = 0 to 100° F

   Energy balance equation of heat exchanger is
   $$HsWs = CpWp(T2 - T1)$$

   b) Explain in brief Loop gain and its effect on stability. **[8]**

Q5) a) Discuss application issues such that, the input-output processing related to feedback control to provide accuracy and reliability. **[8]**

   b) Describe the four necessary components of feedback control system. State pros & cons of feedback control system. **[8]**

OR

Q6) a) What does tuning a feedback control mean? Explain with suitable example purpose of tuning correlations. **[8]**

   b) Discuss the quantitative control performance criteria for set point input changes. **[8]**

SECTION - II

Q7) a) Two liquid ingredients P & Q are to be blended in the proportion of 1 : 2. Draw control loop schematics to indicate the two ways in which this task can be achieved. Explain operation of each. **[8]**

   b) What are different ways to improve nonlinear process performance? Explain in brief Dead Band & Dead Zone. **[8]**

OR

Q8) a) What is cascade control system? When are such systems used in process control applications? Illustrate with neat sketch a cascade control system. **[8]**

   b) Explain with sketches selective & split range control. Give one example of each type. **[8]**

Q9) a) Discuss in brief Interaction & Decoupling of process variables. **[10]**

b) Explain in brief procedure for calculating Relative Gain Array for 2 × 2 system. List important properties of RGA. **[8]**

OR

Q10) In-line blending of two streams outlet flow F3 and composition x are to be controlled. The available manipulated variables are the inlet flows F1& F2. Composition is defined as the fraction of component F1. The process is linear and instantaneous. **[18]**

a) Draw the process flow diagram.

b) Calculate the RGA.

c) How would you pair the input-output variables for this process? Why?

d) Draw the control instrumentation on process flow diagram.

e) Suggest suitable technique to eliminate interaction and also draw revised control instrumentation on process flow diagram.

Q11) a) What is model based control? Explain with suitable block diagram. **[8]**

b) Describe step analysis or % incompletion method for finding time constants of a two time constant system. **[8]**

OR

Q12) a) Explain with neat block diagram the working of Fuzzy Logic controller. **[8]**

b) Explain with suitable block schematic self tuning regulator. **[8]**

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P1179

[4064]-252

B.E. (Computer Engineering)
OPERATING SYSTEMS
(2003 Course) (410442) (Sem. - I)

Time : 3 Hours]   *[Max. Marks : 100*

Instructions to the candidates:

1) *Answers to the two sections should be written in separate books.*

2) *Figures to the right indicate full marks.*

3) *Neat diagrams must be drawn wherever necessary.*

4) *Assume suitable data, if necessary.*

SECTION - I

Q1) a) What is critical section problem? State the requirements to solve the critical section problem. State and explain in brief different solutions to critical section problem. **[8]**

b) Explain the concept of monitor with neat diagram. Write a solution to dining - philosopher problem using Monitor. **[8]**

OR

Q2) a) Discuss Reader writer problem. Give a solution to reader writer problem using semaphores considering writers have priority. **[8]**

b) What is binary and general semaphore? Write implementation of both the semaphore primitives. Also write an implementation of general semaphore using binary semaphore. **[8]**

Q3) a) State the necessary conditions for deadlock occurrence in a system. Discuss various methods of recovery from deadlock. **[8]**

b) State and explain different methods for user authentication and security. **[8]**

OR

P.T.O.

Q4) a) The OS contain 4 resources and 5 Processes. There are no unsatisfied requests for resources. The present availability of resources is (2,1,0,0) The current resource allocation state is as shown below. **[8]**

	Current Allocation				Max Demand			
	A	B	C	D	A	B	C	D
P0	0	0	1	2	0	0	1	2
P1	2	0	0	0	2	7	5	0
P2	0	0	3	4	6	6	5	6
P3	2	3	5	4	4	3	5	6
P4	0	3	3	2	0	6	5	2

    i) Compute need matrix. Is the current allocation is in a safe state.

    ii) Can the request made by process P2 arrives for (0,1,0,0) be granted. Show the stepwise execution.

b) How access matrix is used in protection domain. Explain various methods to implement access matrix. **[8]**

Q5) a) Explain with neat diagram UNIX kernel Architecture. **[10]**

b) What is Buffer cache? Explain detail structure of Buffer pool. Also state advantages and disadvantages of buffer cache. **[8]**

OR

Q6) a) Explain salient features of UNIX OS. Also explain assumptions about hardware. **[8]**

b) Write and explain the algorithm for buffer allocation. **[10]**

SECTION - II

Q7) a) Explain the structure of a super block and how it speeds up the process of assigning the new inode to a file with example. **[8]**

b) Write different file types and access permissions in UNIX. Enlist and explain in brief different system calls which are used to create different type of files. Write a UNIX command with example for modifying file attributes. **[10]**

OR

Q8) a) State the mount table fields and explain how the fields are used in mounting operation. **[8]**

b) What are links in UNIX. Explain its types with example. **[4]**

c) What is inode? Write in brief about disk inode and incore inode. **[6]**

Q9) a) Draw and explain UNIX process state transition diagram in detail. **[8]**

b) What is context of a process. In which scenarios kernel saves the context of a process. Explain each scenario in detail. **[8]**

OR

Q10) a) What are signals in UNIX? How kernel handles signals explain in detail. **[8]**

b) Explain in detail about UNIX process scheduling. **[8]**

Q11) a) Write an algorithm for the swapper in Unix and explain the situations when the processes gets swapped in and swapped out. **[8]**

b) Streams are schemes for improving modularity of device drivers and protocols justify. **[8]**

OR

Q12) a) What is device driver? What is classification of device driver? Also explain Driver entry points? **[8]**

b) Explain demand paging in UNIX. **[8]**

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P1192

[4064]-511

B.E. (Instrumentation & Control) (Sem. - I)
BUILDING AUTOMATION - I
(Elective - I) (2008 Course) (414443 D)

Time : 3 Hours] *[Max. Marks : 100*

Instructions to the candidates:
1) *Answers to the two sections should be written in separate answer book.*
2) *Figures to the right indicate full marks.*
3) *Use of electronic calculator is allowed.*

SECTION - I

Q1) a) Draw basic block diagram of building life safety system. Explain each block in detail. **[10]**

b) Explain Fire Triangle, Fire Signature, and Fire Stages. **[8]**

OR

Q2) a) Explain Central Processing Unit, Display Interface & Power Supply of FACP. **[10]**

b) Explain SLC Interface card and SLC communication protocol. **[8]**

Q3) a) Enlist different Automatic Fire detector, Explain any two fire detector. with help of Principle of operation, construction, Application. **[12]**

b) What are types of Notification Appliances, Give two Example of each type. **[4]**

OR

Q4) a) What are types of Heat Detector? Explain LHS Cable with Types & Applications. **[12]**

b) Explain Air Sampling Detector. **[4]**

Q5) a) Explain different guidelines for installation of initiating devices, made by NFPA. **[10]**

b) Write short note on Fire Sprinkler system. **[6]**

OR

Q6) a) Explain different guidelines for installation of notification devices, made by NFPA. **[10]**

b) Explain Cause Effect Matrix. **[6]**

SECTION - II

Q7) a) What is need of Access Control Systems? Explain the categories of Access Control. **[8]**

b) Explain 26 bit & 31 bit Weignad format. Explain how Reader & Host are connected in Weignad format. **[8]**

OR

Q8) a) Explain biometrics used in Access Control systems. Explain types of Biometrics. **[8]**

b) Explain how templates are generated in Biometrics. Explain False Acceptance & False Rejection. **[8]**

Q9) a) What are Technical tips for Camera & Lens selection? Calculate Focal length in mm if vertical size of CCD sensor is 4.8 mm, distance between lens & Subject is 3 meters; Vertical size of subject is 3.5 meters. **[12]**

b) Explain different video Broadcast Standards. **[6]**

OR

Q10) a) What do you mean data compression? Explain MPEG-4 type data compression in detail. If size of data in compressed form is 128KB and original size of 512KB find Compression ratio. **[12]**

b) Write short note on Video Streamer. **[6]**

Q11) a) What are Intrusion Detection systems? Explain its importance & related Terminologies. **[8]**

b) Explain various type of Intrusion detection system. **[8]**

OR

Q12) a) What is CCTV control Room? Explain Control Room Activities. **[8]**

b) Explain one Application of perimeter security in details. **[8]**

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P1193

[4064]-515

B.E. (Instrumentation & Control)
406265 D : Automobile Instrumentation
(Sem. - I) (2008 Course) (Elective - II)

Time : 3 Hours]　　　　　　　　　　　　　　　　　　*[Max. Marks : 100*

Instructions to the candidates:
1) *Answer any three questions from each section.*
2) *Answers to the two sections should be written in separate answer books.*
3) *Neat diagrams must be drawn wherever necessary.*
4) *Figures to the right indicate full marks.*
5) *Your answer will be valued as a whole.*
6) *Use of logarithmic tables slide rule, Mollier charts, electronic pocket calculator and steam table is allowed.*
7) *Assume suitable data, if necessary.*

SECTION - I

Q1) a) What are the factors which motivates the automation in Automobile industry? **[6]**

b) Explain various open loop and close loop components of engine management system? **[10]**

OR

Q2) a) Explain the concept of electronic control system? **[6]**

b) Explain about various components involved in mechanism of vehicle motion control system. **[10]**

Q3) a) Explain principle of fuel injection with neat block diagram. **[6]**

b) What is multi port or point fuel injection system in regards with automobile Engine operation? Explain it with neat block diagram? **[10]**

OR

Q4) a) Explain ignition system in automobile. **[6]**

b) Types of solid state ignition systems? and **[2]**

c) their (solid state ignition systems) principle of operation, **[5]**

d) Electronic spark timing control system (steps involved) **[3]**

P.T.O.

Q5) a) Define following terms with Engine performance terms [15]
  i) Power
  ii) BSFC
  iii) Volumetric Efficiency.
  iv) Thermal Efficiency.
  v) Calibration
 b) What is engine mapping? [3]

<p align="center">OR</p>

Q6) a) Concept of electronic engine control system? Components of an electronically controlled engine? [8]
 b) Explain various modes of electronic engine control system. [10]

SECTION - II

Q7) a) Explain the Principal of Electronic Braking? [6]
 b) Define and Explain ABS, ASR and ESP? [10]

<p align="center">OR</p>

Q8) a) Explain automatic transmission electronic control circuit? [8]
 b) Write a short note on Cruise control circuit? [8]

Q9) a) What is instrumentation involved w.r.t. Automobile applications in
  i) Automotive central locking and [5]
  ii) Anti theft system control technology. [5]
 b) Instrumentation involved in electronically controlled doors and windows. [6]

<p align="center">OR</p>

Q10) a) What is an air bag technology in automobile? What is its need? [6]
 b) List out various components involved in auto body control technology? [3]
 c) Explain in brief principle control circuit components and characteristics of any two of them in brief? [7]

Q11) a) Explain role of Instrumentation in driver information system? [6]
 b) Write a short note on automatic gearing control system? [6]
 c) Write a short note on emission standards in automobile sector? [6]

<p align="center">OR</p>

Q12) Explain in brief Ergonomics and safety aspect in automobile w.r.t following points. [18]
 a) Lighting system components.
 b) Steering control techniques.
 c) Battery monitoring and control.

<p align="center">◆◆◆◆</p>

P1194

[4064]-527
B.E. (Printing)
SECURITY PRINTING
(2008 Course) (Elective - II) (Sem. - I) (408282(A))

Time : 3 Hours]   *[Max. Marks : 100*

Instructions to the candidates:
   1)   All questions are compulsory answer any one of each question A or B.
   2)   Questions 1,2,4 and 5 have 16 marks and questions 3 and 6 have 18 marks.
   3)   Always start a new question on a new page, Do not use shortforms in your answers.

SECTION - I

Q1) a)   Describe in detail what you understand by the term Security Printing.

                                          OR

       b)   Financial document security and importance.

Q2) a)   When designing security documents considerations to be taken into account.

                                          OR

       b)   Describe in detail any one process of security printing.

Q3) a)   What is RFID technology. When did it start and what is the present scenario of the same.

                                          OR

       b)   Define Smart Cards, Club Cards, Credit/Debit Cards, Pre-paid currency cards. Which of these have direct financial implications. And how.

SECTION - II

Q4) a)   Define MICR Printing. Since when did it start in India. What is the use of the same.

                                          OR

       b)   Explain the layout of the MICR cheque as used in India explaining the code line.

Q5) a)   What are the Substrates used in Security Printing. Importance of special inks and watermarks on substrates.

                                          OR

       b)   Use of invisible UV inks. And Thermochromatic Ink. Where and purpose of the same.

                                                                        P.T.O.

Q6) a)   What is the importance of Brand security and brand protection.

OR

b)   Use of invisible document security, describe in detail what is done.

♦♦♦♦

P1195

[4064]-543

B.E. (Chemical)

PETROLEUM REFINING

(2008 Course) (Elective - II) (Sem. - I) (409342(F))

Time : 3 Hours]   *[Max. Marks : 100*

Instructions to the candidates:

1) *Answer any 3 questions from each section.*
2) *Neat diagrams must be drawn wherever necessary.*
3) *Figures to the right indicate full marks.*
4) *Your answer will be valued as a whole.*
5) *Assume suitable data, if necessary.*

SECTION - I

Q1) a)   Explain any two methods used for dewaxing of lube oil.   **[10]**

   b)   Explain various types of Crude and their significance.   **[6]**

OR

Q2) Describe desalting of crude oil? Describe in details single and two stage desalting.   **[16]**

Q3) Explain Reforming, with various chemical reactions with neat diagram.   **[16]**

OR

Q4) Discuss in details on formation of Crude oil. Enlist oil reserves in the world and explain the oil exploration mechanism.   **[16]**

Q5) Explain Atmospheric Distillation.   **[18]**

OR

Q6) Describe with neat sketches : Hydro cracking.   **[18]**

SECTION - II

Q7) What is FCC? Discuss about FCC with regenerator with neat sketches.   **[18]**

OR

Q8) Write down Health, safety, and environmental impact along with precautions in refinary.   **[18]**

Q9) a) Explain strategies of marketing of petroleum products. **[10]**

b) Write a note on packing materials for petroleum products. **[6]**

OR

Q10) a) Discuss in details : HDA **[8]**

b) What are various applications of lube oils. **[8]**

Q11) a) Discuss various trends in petroleum distillation. **[8]**

b) Explain settling and moisture removal in pre-refining. **[8]**

OR

Q12) What is Acid Refining? Explain its necessity along with detailed process. **[16]**

♦♦♦♦

P1203

[4064]-5

B.E. (Civil)
ADVANCED GEO TECH. ENGG.
(2003 Course) (Elective - I) (401005) (Sem. - I)

Time : 3 Hours]   *[Max. Marks : 100*

Instructions to the candidates:
   1) *Answer Three questions from Section - I and Three questions from Section - II. Strictly as per instructions in the paper.*
   2) *Answers to the two sections should be written in separate books.*
   3) *Neat diagrams must be drawn wherever necessary.*
   4) *Figures to the right indicate full marks.*
   5) *Use of logarithmic tables, slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.*
   6) *Assume suitable data, if necessary.*

SECTION - I

Q1) a) State the criteria, that the following soils will have to satisfy, so as to classify them as :-
   i)   GW
   ii)   SP
   iii) CI
   iv)   MH
   v)   SW and
   vi)   Black cotton soil.

   b) State with reasons, where the soils mentioned in question 1(a), above are or are not useful in civil Engineering works.

                                                                    [18]

OR

Q2) a) The results of mechanical sieve analysis and consistancy tests on soils P,Q, R are given below. Classify the soils, and state its properties.

soil sample	cummulative % of soil retained on		Liquid limit	Plastic Limit	co-efficient of unifermity Cu
	75 µ	4.75 mm			
A	95%	5%	-	-	6
B	45%	40%	40	15	-
C	45%	5%	40	25	-

b) From the information available for soil A and B, in the following table classify soils, state likely clay mineral present, and swelling potential.

soil	Liquid limit	plastic limit	% of clay	classification	type of clay mineral
A	55	20	14	?	?
B	55	20	70	?	?

[18]

Q3) a) Explain difference between earth pressure theory by Rankine and wedge theory on following points :-
i) Inclination of retaining wall.
ii) Angle of wall friction.
iii) Inclination of ground surface.
iv) Direction and point of application of active earth pressure.
v) Accuracy of results.
vi) Popularity and version therefor.

b) Explain with neat suitable sketches, how active earth pressure on a rough retaining wall can be found out, if angle of wall friction and angle of internal friction of back fill soil is same.

[16]

OR

Q4) a) Explain difference between gravity type retaining wall and cantilever sheet pile.

b) State factors on which selection of following types of retaining wall depend :-
i) Gravity wall.
ii) Counter fort retaining wall.
iii) Cantilever sheet pile.
iv) Anchored sheet pile.

c) Graphically find out active earth pressure acting on vertical retaining wall of 6 m height, with back fill consisting of sand having angle of internal friction of 25°.

[16]

Q5) a) Explain different types of geotextiles and stage its characteristics.

b) Explain with suitable sketches, applications of geotextiles.

c) Explain the reasons due to which grouted soil nails can fail and measures taken to profect against failure.

[16]

<center>OR</center>

Q6) a) Explain step by step, how design of reinforced earth is carried out.

b) Explain procedure of laying of geotextiles and state functions of textiles.

<div align="right">[16]</div>

<center>**SECTION - II**</center>

Q7) a) Define natural frequency and state how would you calculate the same.

b) Explain with a sketch graphical relation between deflection (on x axis) and bearing pressure (y - axis) for gravel, hard clay and sandy clay.

c) Explain the relation between permissible bearing pressure for dynamic load and for static load and state why there is difference between the two.

d) Explain the concept of amplitude of vibration and how would you calculate the same.

<div align="right">[17]</div>

<center>OR</center>

Q8) For a typical impact type of machine foundation, discuss the following :

a) Draw a sketch, name important components of the system.

b) Give description and use of each.

c) State guide lines for design.

<div align="right">[17]</div>

Q9) Explain with sketches the following types of ground improvement techniques along with principles and constructional procedure and areas where these are used. <div align="right">[17]</div>

a) Compaction piles.

b) Sand drains.

c) Vibroflotation.

<center>OR</center>

Q10) a) Explain by drawing a table showing size of soil grain with classification (x - axis) and eight different methods used for in place treatment on other axis.

b) Explain the following with reference to blasting.

    i) General Procedure

    ii) Specifications.

    iii) Precaution.

<div align="right">[17]</div>

Q11) a) Explain the following in connection with soil

     i)   Secondary consolidation

     ii)   Creep

   b) Discuss with figures how would you model

     i)   Elastic deformation

     ii)   Newtonian deformation

     iii)   Yield stress deformation

[16]

OR

Q12) Starting with three fundamental models of elastic, viscous and friction develope the models suggested by Burger and Bingham and present them with sketch, mathematical and graphical presentation. **[16]**

◆◆◆◆

P1205

[4064]-185
B.E. (Chemical)
ENVIRONMENTAL ENGINEERING
(2003 Course) (Elective - I) (Sem. - I) (409341)

Time : 3 Hours]   *[Max. Marks : 100*

Instructions to the candidates:
  1) *Answer any three questions from each section.*
  2) *Answers to the two sections should be written in separate books.*
  3) *Neat diagrams must be drawn wherever necessary.*
  4) *Figures to the right indicate full marks.*
  5) *Use of logarithmic tables slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.*
  6) *Assume suitable data, if necessary.*

SECTION - I

Q1) a) Explain Impact of population growth on environment.
   b) Explain environmental impact of thermal, hydro & nuclear power on environment.

                                                                        [18]

OR

Q2) a) Explain kyoto protocol.
   b) Discuss various air pollution laws.

                                                                        [18]

Q3) Discuss the effects of particulate and gaseous pollutants on human health, vegetation and materials.   **[16]**

OR

Q4) Why sampling & measurement of air pollutants are important? Give the different sampling & measurement techniques and explain it.   **[16]**

Q5) Discuss with neat figure, flow sheet operating data, design equations etc. any particulate emission control technique as working in industry.   **[16]**

OR

Q6) Discuss the principles of two basic methods of flue gas desul phurisation namely dry & wet methods, and explain.   **[16]**

                                                                        P.T.O.

SECTION - II

Q7) a) Define domestic and industrial wastewater, with example.

b) Discuss different water pollutants present in waste water.

[16]

OR

Q8) Define & explain the significance of the following term. **[16]**

a) DO

b) BOD

c) COD

d) TOC

e) TSS

Q9) a) Describe discrete settling method in primary treatment of wastewater.

b) What is oxygen sag curve & its effects, with neat figure.

[18]

OR

Q10) Explain with neat sketch UASB reactor, its advantages, disadvantages and working. **[18]**

Q11) Write short notes on : **[16]**

a) Water pollution by pesticides & detergents.

b) Sludge Treatment & disposal.

OR

Q12) Write short notes on :- **[16]**

a) Composting.

b) Incineration process in solid waste management.

♦♦♦♦

P1210

[4064]-566

B.E. (Petrochemical Engineering)
GREEN CHEMISTRY
(2008 Course) (Elective - I) (Sem. - I) (412404(C))

Time : 3 Hours]   *[Max. Marks : 100*

Instructions to the candidates:
  1) Answer three questions from section I and three questions from section II.
  2) Answers to the two sections should be written in separate answer books.
  3) Neat diagrams must be drawn wherever necessary.
  4) Figures to the right indicate full marks.

SECTION - I

Q1) a) Mention significance of green chemistry and related technology. Comment on the role and responsibilities of chemical scientists and engineers towards promotion of green processes.   **[12]**

   b) Write a note on solvent free systems.   **[6]**

OR

Q2) a) Give an overview of twelve principles of green chemistry.   **[12]**

   b) Mention methods used for measuring toxicity.   **[6]**

Q3) a) Explain the extraction process for decaffeination of coffee using supercritical CO_2.   **[10]**

   b) Write a note on continuous supercritical hydrogen reactor.   **[6]**

OR

Q4) a) Mention advantages and disadvantages of using water as a reaction solvent. Mention examples of processes where water can be used as reaction solvent.   **[8]**

   b) Write a note on ionic liquids and mention their applications as catalysts and solvents.   **[8]**

Q5) a) What are zeolites? Mention the role of zeolites in catalytic cracking.   **[8]**

   b) Write a note on catalysts used for oxidation.   **[8]**

OR

Q6) a) Write notes on :   **[10]**
      i)   Biocatalysis.
      ii) Photocatalysis.

   b) Mention green advantages in using phase transfer catalysts.   **[6]**

SECTION - II

Q7) a) Write a note on environmental management systems and ecolevels. **[10]**

b) Compare the chemical and fermentation route for production of lactic acid. **[8]**

OR

Q8) a) Write a note on biomass conversion processes. **[10]**

b) Write a note on green process metrics. **[8]**

Q9) a) Describe the process for preparation of adipic acid from glucose using E coli. **[10]**

b) Write a note on green house effect. **[6]**

OR

Q10) a) Explain functioning of fuel cell and describe any two types. **[10]**

b) Write a note on solar heating and photovoltaics. **[6]**

Q11) a) Mention significant considerations for a batch reactor for the green process approach. **[10]**

b) Mention advantages and challenges faced by photochemical processes. **[6]**

OR

Q12) a) Write a note on minimization and simplification as concepts of inherently safer design. **[10]**

b) Define and explain the concept of process intensification. **[6]**

♦♦♦♦

P541

[4064]-241

B.E. (Polymer Engg)

INDUSTRIAL MANAGEMENT AND PROCESS ECONOMICS
(2003 Course) (Sem. - II) (409370)

Time : 3 Hours]   *[Max. Marks : 100*

Instructions to the candidates:

1) *In section I attempt Q.No. 1and 2, Q.No. 3 or Q.No. 4, Q.No. 5 or Q.No. 6 In section II attempt Q.No. 7 or 8, Q.No. 9 or 10, Q.No. 11 or 12.*
2) *Answer to the two sections should be written in separate books.*
3) *Neat diagrams must be drawn wherever necessary.*
4) *Figures to the right indicate full marks.*
5) *Use of electronic pocket calculator is allowed.*
6) *Assume suitable data, if necessary.*

SECTION - I

Q1) a) What is the structure of manufacturing organization? Explain its need. **[8]**

b) Explain : **[9]**
   i) Break even point.
   ii) P/V ratio
   Following details are available for company XYZ private Limited :
   Actual sales : Rs. 20,000
   Break Even Sales : Rs. 10,000
   Fixed cost : Rs. 5000
   Find out p/v ratio and profit at actual sales.

OR

Q2) a) Explain the objectives and principles of a good plant layout. **[8]**

b) A company produces a single article and sells at Rs. 10 each. The marginal cost of production is Rs. 6 each and total fixed cost of the concern is Rs. 400 per annum. **[9]**

   Construct a break - even chart and show :
   i) Break - even point.
   ii) Margin of safety at sales Rs. 1500.
   iii) Angle of incidence.

Q3) a) A project requires an outlay of Rs. 1,00,000 and earns the annual cash inflow of Rs. 25,000, Rs. 30,000 Rs. 20,000 and Rs. 50,000. Calculate pay back period. **[6]**

b) Explain the term "working capital" and discuss about its sources. **[6]**

c) What are the limitations of capital budgeting. **[5]**

OR

Q4) a) A project involves the investment of Rs. 5,00,000 which yields profits as stated below :

Years	Profit (Rs.)
1	25,000
2	37,500
3	62,500
4	65,000
5	40,000

At the end of 5 years, the machineries in the project can be sold for Rs. 40,000. Find the accounting rate of return. **[6]**

b) Explain : **[6]**
   i)   Preference shares.
   ii) Debentures.

c) What are the factors affecting fixed capital requirement? **[5]**

Q5) a) Explain Depreciation. What is the difference between production unit method and production hour method for depreciation? **[8]**

b) The original investment for an asset was Rs. 14,000 and the asset was assumed to have a service life of 12 years with Rs. 2000 average value at the end of service life. After the asset has been used for 5 years, the remaining service life and final salvage value are estimated of 10 years and Rs. 1,000 respectively. Under these conditions what is the depreciation cost during sixth year of the total life if straight line depreciation method is used. **[8]**

OR

Q6) a) What are the merits of budgetary control? **[5]**

b) Explain the Joint factor rate method for depreciation. **[5]**

c) The cost of a machine is Rs. 1,00,000 The life of the machine is 10 years and its estimated scrap value is Rs. 50,000. Estimated number of units produced during the life of machine is 50,000. If in a particular year, the machine produces 6000 units. Find the depreciation using joint factor rate method. **[6]**

SECTION - II

Q7) a) Solve the following Linear Programming problem, using simplex technique.

Maximize $p = 40x + 25y + 50z$, subject to material constraints

$x + 2y + z \le 36$

$2x + y + 4z \le 60$

$2x + 5y + z \le 45$

and $x, y, z \ge 0$ **[9]**

b) Six jobs go first over machine I and then over II. The order of the completion of jobs has no significance. The following table gives the machine times in hours for six jobs and the two machines.

Job No. :	1	2	3	4	5	6
Machine I :	5	9	4	7	8	6
Machine II :	7	4	8	3	9	5

Find the sequence of the jobs that minimizes the total elapsed time to complete the jobs. Find the idle time on each machine. **[8]**

OR

Q8) a) Obtain an optimum basic feasible solution to the following transportation problem. **[9]**

	To			Availability
	7	3	4	2
From	2	1	3	3
	3	4	6	5
Demand	4	1	5	

b) Solve the following assignment problem (Minimization of costs given in matrix) **[8]**

	1	2	3	4
A	10	12	19	11
B	5	10	7	8
C	12	14	13	11
D	8	15	11	9

Q9) a) A project has the following time schedule **[9]**

Activity	Time in months	Activity	Time in months
(1-2)	2	(4-6)	3
(1-3)	2	(5-8)	1
(1-4)	1	(6-9)	5
(2-5)	4	(7-8)	4
(3-6)	8	(8-9)	3
(3-7)	5		

Construct PERT network and compute :
  i)   Total float for each activity
  ii) Critical path and its duration.

b) The manager of a Flower - stop premises its customers delivery with in four hours on all flower orders. All flowers are purchased on the previous day and delivered to parker by 8.00 a.m. the next morning the daily demand for roses is as follows :

Dozens of roses : 70   80   90   100
Probability   : 0.1   0.2   0.4   0.3

The manager purchases roses for Rs. 10 per dozen and sells them for Rs. 30. All unsold rozes are donated to a local hospital. How many dozens of rozes should manager order each evening to maximize its profit. What is the optimum expected profit. **[8]**

<center>OR</center>

Q10) a) A glass factory specializing in crystal is developing a substantial back log and the firm's management is considering three courses of action: (s_1) arrange for subcontracting (s_2) construct new facilities (s_3) To start over time. The correct choice depends largely upon future demand, which may be low, medium or high. Management ranks the respective probabilities as 0.10, 0.50 and 0.40. A cost analysis reveals the effect upon the profits that is shown in the table below **[9]**

Profit Rs (000) if demand is	courses of action		
	s_1 (subcontracting)	s_2 construct new facilities	s_3 overtime
Low (p = 0.10)	10	–150	–20
medium (p = 0.50)	50	20	60
High (p = 0.40)	50	200	100

Show this decision situation in the form of a decision tree and indicate the most preferred decision and corresponding expected value.

b) i) Solve the game whose pay off matrix is given by **[4]**

<center>B</center>

$$
A \begin{array}{c} \text{I} \\ \text{II} \\ \text{III} \end{array} \begin{bmatrix} -2 & 15 & -2 \\ -5 & -6 & -4 \\ -5 & 20 & -8 \end{bmatrix}
$$

<center>I   II   III</center>

ii) Find the saddle point or points and hence solve the following game. **[4]**

Firm B

$$\text{Firm A} \begin{bmatrix} 3 & -1 & 4 & 6 & 7 \\ -1 & 8 & 2 & 4 & 12 \\ 16 & 8 & 6 & 14 & 12 \\ 1 & 11 & -4 & 2 & 1 \end{bmatrix}$$

Q11) a) A manufacturing company purchases 9000 parts of a machine for its annual requirements, ordering one month usage at a time. Each part costs Rs. 20. The ordering cost per order is Rs. 15, and the carrying charges are 15% of the average inventory per year. Suggest a more economic purchasing policy for the company. How much would is save the company per year. **[8]**

b) A contractor has to supply 10,000 bearings per day to an automobile manufacturer. He finds that, when the starts production run, he can produce 25000 bearings per day. The cost of holding a bearing in stock for a year is Rs. 2 and the set up cost of a production run is Rs. 1800. How frequently should production run be made? **[8]**

OR

Q12) a) Find the optimum order quantity for a product for which the price breaks are as follows **[8]**

Quantity	Unit cost (Rs.)
$0 \leq q_1 \leq 500$	10.00
$500 \leq q_2$	9.50

The monthly demand for a product is 150 units. The cost of storage is 1% of unit cost and the cost of ordering is Rs. 250

b) Explain elaborately, what is ABC analysis. **[8]**

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P542

[4064]-242

B.E. (Polymer)
SPECIALITY POLYMERS
(2003 Course) (409367) (Elective - II) (Sem. - II)

Time : 3 Hours]   *[Max. Marks : 100*

Instructions to the candidates:

1) *Answer 3 questions from section I and 3 questions from section II.*
2) *Answers to the two sections should be written in separate books.*
3) *Neat diagrams must be drawn wherever necessary.*
4) *Figures to the right indicate full marks.*
5) *Use of logarithmic tables slide rule mollier charts, electronic pocket calculator and steam tables is allowed.*
6) *Assume suitable data, if necessary.*

SECTION - I

Q1) a) What are liquid crystalline polymers? Give their detailed classification.**[8]**

b) List a few commercial liquid crystalline polymers.   **[4]**

c) Discuss in brief the structural factors responsible for exhibiting liquid crystalline behaviour.   **[6]**

OR

Q2) a) State the typical characteristics of Liquid crystalline polymers.   **[6]**

b) Explain the following terms   **[6]**
   i) Mesogen
   ii) Nematic
   iii) Smectic

c) Differentiate between Thermotropic and Lyotropic Liquid crystalline polymers. Give one example of each.   **[6]**

Q3) a) Explain the band theory of conduction in conducting polymers.   **[6]**

b) Draw structures of 4 conducting polymers.   **[4]**

c) Discuss any 3 conducting polymers and give their applications.   **[6]**

OR

Q4) a) Discuss different ways to improve conductivity in polymers.   **[4]**

b) Explain the terms w.r.t. conducting polymers.   **[6]**
   i) Bipolaron
   ii) Polaron
   iii) Solitron

c) Justify with suitable structure polypyrole is a conducting polymer.   **[6]**

P.T.O.

Q5) a) List the structural criteria required to get heat resistance in a polymer. **[5]**

b) List any 3 heat resistant polymers and give 2 applications of each one of them. **[6]**

c) Discuss how molecular weight affects thermal stability and therefore the heat resistance of given polymeric material. **[5]**

<div align="center">OR</div>

Q6) a) What are heat resistant polymers? Draw their structures. **[6]**

b) Give different constituents of polymers which decrease their heat resistance. **[4]**

c) Discuss the various applications of heat resistant polymers. **[6]**

<div align="center">

SECTION - II

</div>

Q7) a) Write a short note on photo - sensitive polymers. **[6]**

b) What are positive and negative photoresists? Give one example of each.**[6]**

c) What are "polymeric membranes".? Enlist various applications of membranes. **[4]**

<div align="center">OR</div>

Q8) a) Explain the various methods for manufacturing polymeric membranes. **[6]**

b) What is photolithography? Explain the steps involved in the process. **[6]**

c) List the various polymers used in the making of polymeric membranes. **[4]**

Q9) a) Define the term biomaterials. What are the basic requirements for a material to be a biomaterial? Enlist different applications of the same. **[6]**

b) What are "biocatalysts"? State two applications of biocatalysts. What are the advantages and disadvantages of biocatalysts. **[6]**

c) Write a short note on polymeric drug delivery systems. **[6]**

<div align="center">OR</div>

Q10) Write a short note on **[18]**

a) Biomaterials used in ortho-paedic applications.

b) Biomaterials as scaffold materials.

c) Biomaterials used intissue engineering.

Q11) a) Write a short note one use of polymers in controlled release of agricultural chemicals and seed coatings. **[4]**

b) What are reasons for increasing use of plastics in construction both structural and non- structural? State the share of various plastics in construction giving corresponding applications of each plastic. **[6]**

c) What is a "polymer concrete"? Differentiate between polymer impregnated concrete and portlandcement concrete. **[6]**

OR

Q12) a) What is the principle used in fibre optic cables? State the polymers used in this application. Discuss the structure of a fibre optic cable. **[6]**

b) Write a short note on polymers used in green houses. **[4]**

c) What are mulches in agriculture? What is the reason for mulching? State the polymers used in mulches. **[6]**

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B.E. (Computer Engg. & I.T.)
EMBEDDED SYSTEMS
(2003 Course) (410451) (Sem. - II) (Elective - II)

Time : 3 Hours]   *[Max. Marks : 100*

Instructions to the candidates:

1) *Answers to the two sections should be written in separate answer books.*
2) *In section I attempt : Q.No. 1 or Q.No. 2, Q.No. 3 or Q.No. 4, Q.No. 5 or Q.No. 6. In section II attempt : Q.No. 7 or Q. No. 8, Q. No. 9 or Q.No. 10, Q.No. 11 or Q.No. 12.*
3) *Neat diagrams must be drawn wherever necessary.*
4) *Figures to the right indicate full marks.*
5) *Assume suitable data, if necessary.*

SECTION - I

Q1) a) With the help of neat diagram, describe different components of embedded systems. **[6]**

b) Explain programmer's model of ARM7 core. **[6]**

c) Name the area of applications for the following processors : **[4]**

    i) Digital signal processor.

    ii) Media processor

OR

Q2) a) What are the different characteristics of embedded systems? Explain. **[6]**

b) Classify different embedded systems. List commonly used microcontrollers in each category. **[6]**

c) Explain different operating modes of ARM7 core. **[4]**

Q3) a) It is required to design a data acquisition system. For this application select the appropriate processor based on : **[8]**

    i) Instruction cycle time

    ii) Bus width

    iii) MIPS

    iv) On - chip RAM/ ROM / EEPROM / Flash memory

    v) On - chip cache

    vi) Number of interrupts

b) What is Watchdog timer? Explain its importance in embedded systems? **[6]**

c) Explain the process of converting an assembly program into a file for ROM image. **[4]**

<div align="center">OR</div>

Q4) a) It is required to design a real time robot control system. For This application select the appropriate processor based on : **[8]**

      i) Instruction cycle time

      ii) Bus width

      iii) MIPS

      iv) On - chip RAM / ROM / EEPROM / Flash memory

      v) On - chip cache

      vi) Number of interrupts

    b) What are different ways to supply power to an embedded system? What are different ways to manage the power supply? **[8]**

    c) List the different types of memories for embedded systems. **[2]**

Q5) a) What is the role of ADC and DAC in embedded systems? Name two applications for each converter. **[6]**

    b) Explain with neat diagrams, the data transfer mechanism on I^2C bus. **[10]**

<div align="center">OR</div>

Q6) a) How does host recognize the device insertion in USB protocol? **[6]**

    b) Compare USB and CAN protocols. **[4]**

    c) Explain the following terms : **[6]**

      i) Context

      ii) Interrupt Latency

      iii) Deadline

<div align="center">**SECTION - II**</div>

Q7) a) How C ++ is useful in embedded system programming? Also mention its disadvantages . **[8]**

    b) What is an IDE (Integrated Development Environment)? What is it consists of ? **[4]**

    c) What is the use of JTAG port and RS - 232 C port available on of a development board (Application board)? **[6]**

<div align="center">OR</div>

Q8) a) When do you use Java as programming language for embedded system? What are the disadvantages of Java? **[8]**

    b) What is In-Circuit-Emulator? Give details. **[6]**

    c) What is the difference between stack and queue in C? **[4]**

Q9) a) Compare the following scheduling models of RTOS, based on worst case latency: **[8]**

  i) Cooperative Round Robin

  ii) Cooperative ordered list

  iii) Cooperative Time slicing (rate monotonic)

b) What are the different ways to handle interrupts in RTOS environment? **[6]**

c) Name two advanced scheduling algorithms. **[2]**

OR

Q10) a) Explain the significance of task scheduling in RTOS. Also explain preemptive scheduling model used in RTOS. **[8]**

b) How interrupt latency affects the performance of an embedded system? Explain. **[4]**

c) Differentiate between RTOS and desktop OS. **[4]**

Q11) a) Discuss different features of Micro C/OS-II. Which type of RTOS is it? **[6]**

b) Design a contact based smart card system for banking application. Discuss the details of required hardware and required software design issues. **[10]**

OR

Q12) a) Discuss different applications where VxWorks is used. Also list its features. **[6]**

b) Given : An application for sending application layer byte streams on a TCP / IP network.
Discuss different tasks and their functions along with their synchronization. **[10]**

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B.E. (Information Technology)
DISTRIBUTED SYSTEMS
(2003 Course) (Sem. - II) (414449)

Time : 3 Hours]　　　　　　　　　　　　　　　　　　*[Max. Marks : 100*

Instructions to the candidates:

　1)　*Answer Question 1 or 2, 3 or 4, and 5 or 6 from section - I and Question 7 or 8, 9 or 10, and 11 or 12 from section - II.*

　2)　*Answers to the two sections should be written in separate answer sheet.*

　3)　*Neat diagrams must be drawn wherever necessary.*

　4)　*Figures to the right indicate full marks.*

　5)　*Assume suitable data, if necessary.*

SECTION - I

Q1) a) Explain what is meant by transparency and give example of different types of transparency. **[8]**

　　b) Define distributed system. List and explain examples of distributed systems. **[8]**

OR

Q2) a) Distinguish between the client - server and peer - to - peer models of distributed systems. **[8]**

　　b) Explain with neat diagram architectural Models of distributed systems. **[8]**

Q3) a) Define : **[8]**
　　　　i)　Client Stub
　　　　ii)　Server Stub
　　　　iii)　Doors
　　　　iv)　Little endian & Big endian

　　b) What is group communication ? Explain different types of group communication. **[8]**

OR

Q4) a) What is RMI? How would you incorporate persistent asynchronous communication into a model of communication based on RMIs to remote objects? **[8]**

　　b) Explain various RPC models in detail. **[8]**

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Q5) a) Compare and contrast distributed file system of CODA with xFS. **[10]**

b) Draw and explain NFS security architecture and give detail functions of layers. **[8]**

OR

Q6) a) Explain Fault tolerant issues in NFS. **[10]**

b) Explain different types of file sharing semantics. **[8]**

SECTION - II

Q7) a) What is Logical Clock? Explain Lamport Timestamps with suitable diagram. **[8]**

b) Explain Ring Algorithm with suitable example. **[8]**

OR

Q8) a) Define **[8]**
   i) Clock Skew
   ii) Mean Solar Second
   iii) Universal Coordinated Time.
   iv) Leap Second

b) What is Mutual Exclusion? Explain any two types of mutual exclusion algorithm. **[8]**

Q9) a) What is message ordering? Explain FIFO order and causally ordered multicast. **[8]**

b) What is Fault tolerance? Explain different types of failures. **[8]**

OR

Q10) a) What are various design issues for process Resilience? Explain in detail. **[8]**

b) What is check pointing? Explain independent check pointing and coordinated check pointing? **[8]**

Q11) a) Draw and explain CORBA ORB architecture. What is indirect binding in CORBA? **[10]**

b) Explain in brief the steps to build CORBA application. **[8]**

OR

Q12) a) Explain different types of clusters with example. **[10]**

b) Explain : OBV, CCM, GIOP, DDS **[8]**

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[4064]-401

B.E. (Civil)

ENVIRONMENTAL ENGINEERING - II

(2008 Course) (Sem. - I) (401001)

Time : 3 Hours]   *[Max. Marks : 100*

Instructions to the candidates:

1) *Solve Q.1 or 2, Q.3 or 4, Q.5 or 6 from section - I and Q.7 or 8, Q.9 or 10, Q.11 or 12 from section -II.*

2) *Answers to the two sections should be written in separate books.*

3) *Neat diagrams must be drawn wherever necessary.*

4) *Figures to the right indicate full marks.*

5) *Use of logarithmic tables slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.*

6) *Assume suitable data, if necessary.*

SECTION - I

Q1) a) Explain the significance of maximum and minimum velocities to be generated in sewer. Give any suitable equation for calculating self cleansing velocity in sewer. **[3+3+2=8]**

b) State the procedure for D.O. fixation and hence explain the necessity of D.O. fixation during determination of D.O. in water. **[2+2=4]**

c) State various ingradients used during preparation of dilution water in BOD test. Give significance of each. **[2+2=4]**

OR

Q2) a) Differentiate between domestic sewage and storm water runoff. **[4]**

b) Find the minimum velocity and gradient required to carry coarse sand particles of size 1.5 mm & sp.gr. 2.65 through a sewer of diameter 0.9m. Assume constants, $\beta = 0.04$, $f = 0.03$ & $N = 0.013$. The sewer may be assumed to run half full. **[6]**

c) List out various appertenances required for proper functioning of sewerage system. Also explain the working of automatic flushing tank. **[2+4=6]**

Q3) a) Explain various factors responsible for self purification of a polluted river. **[6]**

b) Determine the BOD of river water mix on the down stream of point of disposal if sewage of 4 MLD, having BOD_5 of 240 mg/L is discharged in a river. The discharge in the river is 0.40 m³/s having BOD_5 of 3 mg/L. **[4]**

c) Draw a neat sketch of primary sedimentation tank showing different zones of sedimentation. Also comment on the performance of primary sedimentation tanks with reference to removal of suspended solids and corresponding BOD removal. **[2+2+2=6]**

OR

Q4) a) What is DO deficit? Explain oxygen sag curve. **[4]**

b) Draw the flow diagram for primary treatment of sewage. State the type of impurities removed in each unit. **[1+3=4]**

c) Design a grit chamber with proportioning flow wier using following data.
   i)   Sewage flow = 10 MLD
   ii) Grit size = 0.2 mm, sp.gr. =2.65
   iii) Temperature of sewage = 10°C
   iv) Desired removal efficiency = 80%
   v)   Constant $n = 1/4$
   Determine :
   I)   Required surface overflow rate
   II) No. and dimensions of grit channels.
   III) Dimensions of proportioning flow wier.

   [2+3+3=8]

Q5) a) State various modifications in Activated sludge process. Give a brief comparison between conventional Activated sludge process and Extended aeration process with reference to HRT, MCRT, BOD removal efficiency and operation cost. **[3+6=9]**

b) Design a single stage high rate trickling filter for treatment of mixed waste water comprising domestic sewage and industrial waste water.
   Data :
   i)   Domestic sewage flow = 7.5 MLD.
        Industrial w/w flow = 0.5 MLD.
   ii) BOD_5 of raw sewage = 300 mg/L.
        BOD_5 of Industrial waste water = 1200 mg/L.
   iii) BOD removed in primary sedimentation = 30%.
   iv) Organic loading rate = 0.8 Kg/m³/d&.
        Hydraulic loading rate = 15m³/m²/d.
   v)   Recirculation ratio = 2.

Work out :

I) Volume of filter media

II) Dimensions of trickling filter.

III) Efficiency & BOD_5 of treated effluent.

$$[3+3+3=9]$$

OR

Q6) a) Explain the principle and working of trickling filter. Draw a treatment flow sheet for sewage treatment by trickling filter. **[3+3+2=8]**

b) Design a completely mixed activated sludge process for sewage treatment. Use following data.

Data :

i) Sewage flow = 8 MLD.

ii) BOD_5 of raw sewage = 300 mg/L.

iii) Permissible effluent BOD_5 = 30 mg/L.

iv) MLVSS (X) = 3000 mg/L.

v) MCRT (θ_c) = 10 days.

vi) Constants Y = 0.6, kd = 0.03.

vii) Solids concentration in sludge, (X_r) = 10000 mg/L.

Determine,

I) Volume and dimensions of aeration tank.

II) Oxygen requirement & power requirement

III) Sludge recirculation ratio

IV) Food to mass (F/M) ratio

$$[3+3+3+1=10]$$

SECTION - II

Q7) a) Explain the bacteria - algae symbiotic relationship in oxidation pond. **[4]**

b) Give the constructional details and design criteria for oxidation pond. **[4]**

c) Differentiate between oxidation pond and aerated lagoon, with reference to HRT, organic loading method of aeration and operation cost. **[8]**

OR

Q8) a) Explain the principle of working of facultative aerated lagoon. Also state the merits & demerits over aerated lagoon. **[8]**

b) Discuss the phytoremediation technology for waste water treatment. **[4]**

c) Differentiate between activated sludge process and aerated lagoon. **[4]**

Q9) a) Explain the need of sludge treatment and hence differentiate between primary and secondary sludge. **[8]**

b) Design a septic tank and soak pit for a residential complex. Use following data. **[8]**

    i)   Population = 600 persons.

    ii)   Rate of water supply = 135 Lpcd.

    iii)   Desludging period = 3 years.

    iv)   Percolation rate in soil = 5 min/cm.

    v)   Percolation capacity of filter media = 1.25 $m^3/m^3/d$.

OR

Q10) a) Explain the principle of anaerobic digestion and write short note on high rate digester. **[4+4=8]**

b) Draw a neat sketch of up flow anaerobic sludge blanket (UASB) reactor. Explain the principle of working and comment on its suitability for treatment of industrial waste water. **[2+3+3=8]**

Q11) Write short note on : **[6 × 3 = 18]**

    a) Equalization.

    b) Neutralization.

    c) Sludge drying beds.

    d) Sludge thickener.

    e) Anaerobic lagoon.

    f) Discharge standards for disposal of treated effluent in river.

OR

Q12) Give the range of important characteristics of waste water from following industry and draw a suitable flow diagram for treatment for each industry. **[3 × 6 = 18]**

    a) Sugar industry.

    b) Dairy industry

    c) Distillery industry.

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B.E. (CIVIL)

DAMS & HYDRAULIC STRUCTURES

(Sem. - I)(2008 Course) (401002)

Time : 3 Hours]   *[Max. Marks : 100*

Instructions to the candidates:

    1) *Solve Q.1 or Q.2, Q. 3 or Q. 4 , Q.5 or Q.6 from Sec I Q.7 or Q.8. Q.9 or Q.10 Q.11 or Q. 12 from Sec II.*

    2) *Answer any 3 questions from each section.*

    3) *Answer 3 questions from Section I and 3 questions from Section II.*

    4) *Answers to the two section should be written in separate books.*

    5) *Neat diagrams must be drawn wherever necessary.*

    6) *Figures to the right indicate full marks.*

    7) *Use of logarithmic tables, slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.*

    8) *Assume suitable data, if necessary.*

SECTION - I

Q1) a) What factors govern selection of type of dam?   **[4]**

    b) Write short notes on :   **[4]**

        i) Economical height of dam

        ii) Arch dams

    c) Describe in detail 'Instrumentation in dams'.   **[8]**

OR

Q2) a) Describe briefly is guidelines for dam safety.   **[4]**

    b) Write short notes on :   **[12]**

        i) Maintenance of dams.

        ii) Classification of dams.

Q3) A concrete gravity dam of trapezoidal section is having top width of 2 m and bottom width 10 m. Its height is 12 m and the upstream face has a batter of 1H : 10V. Test the stability of the dam for the base section for overturning. Sliding and sheat in the full reservoir condition. Assume no freeboard allowance but allowing for uplift pressure of 100% intensity factor.

Also, determine the compressive stresses at the toe and the heel. Assume weight of concrete to be 24 KN/m^3, unit shear strength of concrete to be 1400 KN/m^2 and coefficient of friction between concrete and foundation soil to be 0.7.   **[18]**

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OR

Q4) a) Discuss the evolution of the actual profile of a gravity dam from its elementary profile and explain the main principles of its design. **[8]**

b) Explain earthquake forces on gravity dam with the help of sketch **[4]**

c) Write short notes on : **[6]**
   i) Drainage gallery.
   ii) Construction joints.

Q5) a) Explain in brief the causes of failure of earth dam. **[8]**

b) Describe the method of plotting phreatic line for an earth dam with and without horizontal filter at the downstream side. **[8]**

OR

Q6) a) Draw a section of an earth dam of 25 m height indicating various parts of the dam. **[2]**

b) Explain the Swedish slip circle method of analysing the stability of an earth dam slopes. **[8]**

c) Write short notes on 'Earth dam construction' **[6]**

SECTION - II

Q7) a) Discuss the various types of energy dissipation devices used below spillways in relation to the positions at Tail water depth & Jump height curve. **[6]**

b) Write a short note on vertical lift gate. **[6]**

c) Compare Khosla's and Bligh's creep length theory for seepage. **[6]**

OR

Q8) a) Design an ogee spillway for concrete gravity dam, for the following data (only d/s profile) **[10]**
   Average river bed level   = 150 m
   Spillway crest RL   = 250 m
   Slope of d/s face of gravity dam   = 0.75 : 1
   Design discharge   = 6450 m³/s
   Spillway length - 5 spans with a clear length of 8 m each.
   Pier thickness   = 2m

b) State the purpose and types of crest gates. Explain the working of a radial gate. **[5]**

c) Explain - how do you apply corrections for **[3]**
   i) Thickness of floor
   ii) Inclination of floor
   iii) Interference of piles

Q9) a) Design an irrigation channel in alluvial soil according to Lacey's Silt theory. **[7]**

　　　　Full supply discharge 　　= 12 m³/s

　　　　Lacey's silt factor 　　= 1

　　　　Channel side slopes 　　= y_2 : 1

　　b) What do you understand by 'Incipient Motion'. Explain Shield's critical tractive force approach. **[9]**

<div align="center">OR</div>

Q10) a) What is a canal fall? When is a canal fall necessary? What are the different types of canal falls? Where are they located? **[8]**

　　b) Sketch various types of cross - drainge works. **[8]**

Q11) a) What is a cut off? Describe briefly how a cut off may be used as a river training measure. Also describe pitched is land. **[8]**

　　b) Distinguish between high head power development scheme and low head scheme, with the help of neat sketches. **[8]**

<div align="center">OR</div>

Q12) a) What is meant by hydro power? What are different types of hydropower plants? Explain any one with a neat sketch. **[8]**

　　b) Write short notes on **[8]**

　　　　i) Objectives & methods of river training.

　　　　ii) Levees.

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[4064]-403
B.E. (CIVIL)
STRUCTURAL DESIGN - III
(Sem. - I) (2008 Course) (401003)

Time : 4 Hours]   *[Max. Marks : 100*

Instructions to the candidates:

    1)   *Answer Q.1 or Q2, Q.3 or Q 4 in section - I*
    2)   *Answer Q.5 or Q6, Q.7 or Q8 in section - II*
    3)   *Answer to the two sections should be written in separate books.*
    4)   *Figures to the right indicate full marks.*
    5)   *Use of IS 1343, IS 456, IS 3370 & non programmable calculator is allowed.*
    6)   *Neat diagrams must be drawn wherever necessary.*
    7)   *Assume any other data if necessary & mention it at the starting of the answer.*
    8)   *Mere reproduction from IS Code as answer, will not be given full credit.*
    9)   *Assume any other data if required.*

SECTION - I

Q1) a) Explain in brief why high grade materials are used for prestressed concrete elements. **[4]**

    b) Explain in the systems of prestressing. **[4]**

    c) An unsymmetrical I section is used to support an imposed load of 11 kN/m over a span of 17 m. The sectional details are top flange 650×150, web 150×650 and bottom flange 350×250 mm. The effective prestressing force is 1125 kN is located at from 70mm from soffit of the section at midspan. Cable profile is parabolic concentric at support. Calculate extreme fiber stresses in concrete at midspan at initial and final stages. Take loss ratio as 0.85 and unit weight concrete as 25 kN/m³ **[17]**

<div align="center">OR</div>

Q2) a) Explain in detail the loss of prestress due to friction. **[8]**

    b) A post tensioned prestressed concrete beam of simply supported span 16 m having the cross sectional details as top flange 450×150, web 120×600 and bottom flange 360×200 mm, The beam is prestressed with 3 No. of 12/5 Freyssinet parabolic cables with their c.g. at 120 mm from extreme bottom fiber, stressed one at a time from only one end to 900 Mpa. Calculate total loss of prestress and jacking force at the age of 120 days, if coefficient of friction = 0.3, coefficient for curvature and wave effect = 0.0026/m length of cable, slip of anchorage at jacking end = 2mm, creep coefficient = 2.4, Es = 2×10^5 Mpa, Creep and relaxation of steel = 1% of initial prestress concrete grade = M40. **[17]**

Q3) Design a post tensioned prestressed concrete 'I' section beam for flexure to carry a live load of 10 kN/m over entire simply supported span of 15 m with M 40 grade of concrete and Freyssinet cables of 12/5 (fy = 1750 Mpa) or 12/7 (fy = 1500 Mpa), including the design of end block. Draw sketches showing cable profiles and end block reinforcement details. Check fiber stresses in concrete and deflection. **[25]**

OR

Q4) a) State remedial measures to be taken to reduce losses in PSC beams. **[5]**

b) A post tensioned prestressed concrete two way slab, 6.5 × 9 m with discontinuous edges to support imposed load of 4kN/m^2. Use S3(three strands, each having cross sectional area 100 mm^2) having fy = 1900 Mpa. Check the safety of the slab against collapse and deflection at service load Take the grade of concrete = M40. **[20]**

SECTION - II

Q5) Figure (1) shows an intermediate frame of a multistoried building the frame are spaced 4 m centre to centre Analyze a rigid jointed frame taking live load of and dead load of 2.8 kN/m^2, 3kN/m^2 for the panels with AB & BC respectively. The self weight of the beam may be taken as follows. Beams of 8m span = 5.5 kN/m and Beams of 4.5m span = 3.5 KN/m.

The relative stiffnesses of the members are marked on the figure. Use portal method for analyzing the frame for horizontal forces and proper substitute frame for vertical loads. Design the section for beam ABC for combined effect of vertical and horizontal Loads. Adopt 15% redistribution of moments for vertical load moments Use M20, Fe415. **[25]**
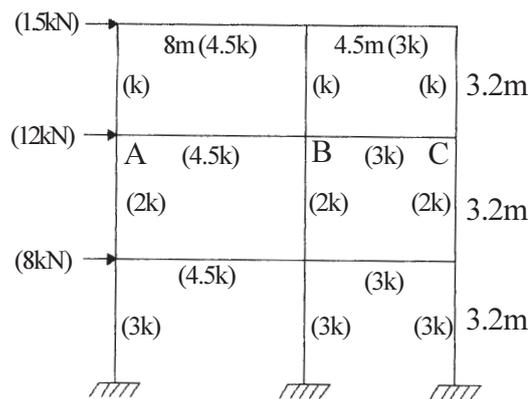
Fig(1)

OR

Q6) a) Write detailed note on substitute frame method. **[8]**

b) Analyze a rigid jointed frame shown in fig (2) by Cantilever method for lateral loads. Flexural rigidity for all members is same. Analyze beam DEF using proper substitute frame, if it is subjected to vertical ultimate

live & dead load incl. of its self wt. intensities of 15 kN/m& 16kN/m on DE and 19kN/m & 20 kN/m on EF respectively. Calculate max. span moment for span DE and support moment at E. Design section for combined effect of vertical and horizontal Loads. Adopt 12% redistribution of moments for vertical load moments Use M20, Fe 500.

[17]

Fig(2)
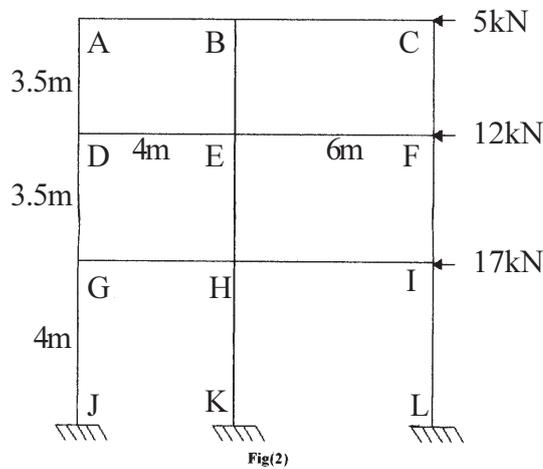
Q7) a) Explain the behavior of cantilever retaining wall. **[5]**

b) Design circular reinforced concrete tank resting on ground to store 4 lakh liters of water. The tank wall is fixed at base and free at top. Take the safe bearing capacity of the supporting strata as 220 kN/m². Design the wall and bottom slab of the tank using IS code. **[20]**

OR

Q8) Two RC columns carry axial loads of 1200 kN & 900 kN respectively, placed 3.5 m c/c. Safe bearing capacity of the underlying strata = 200 kN/m². Use M20, Fe 500. The cantilever projection available from the centre line of the first column up to property line is 1.42m. Design the combined slab type rectangular footing. Draw all details of reinforcement. **[25]**

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B.E. (Civil Engg)

STRUCTURAL DESIGN OF BRIDGES

(2008 Course) (Elective - I)(Sem. - I) (401004A)

Time : 3 Hours]   *[Max. Marks : 100*

Instructions to the candidates:

    1)   From section - I answer Q.1 or Q.2, Q.3 or Q.4 and from section - II answer Q.5 or Q.6 : Q.7 or Q.8.

    2)   Answers to the two sections should be written in separate answer books.

    3)   Figures to the right indicate full marks.

    4)   IRC codes, IS 800, IS 875, IS 1343 and steel table are allowed in the examination.

    5)   Neat diagrams should be drawn wherever necessary.

    6)   If necessary, Assume suitable data and indicate clearly.

    7)   Use of electronic pocket calculator is allowed.

SECTION - I

Q1) a) Explain with neat sketches any three types of Reinforced concrete Bridges. **[9]**

    b) What are the advantages of prestressed concrete bridges?   **[8]**

    c) Explain any two loads considered in the design of highway bridges. **[8]**

OR

Q2) a) Explain the procedure of design of elastomeric bearing along with neat sketch. **[9]**

    b) Explain IRC class AA Wheeled loading with neat sketches.   **[8]**

    c) Explain Pigeaud's method for the analysis of slabs.   **[8]**

Q3) Design the Reinforced Concrete deck slab for the reinforced concrete T - Beam deck slab bridge shown in fig. 3 with the following details.   **[25]**

    a) Thickness of railings - 100mm.

    b) Thickness of footpath - 175 mm

    c) Thickness of wearing coat - 80mm

    d) Span of main girder - 24.0m

    e) Spacing of main girders - 2.5m c/c

    f) Spacing of cross - beams - 4.0m c/c

    g) Live load - IRC Class AA Tracked Vehicle.

h) Materials - M30 grade of concrete and Fe 415 grade of steel.

i) Adopt $m_1 = 0.07$ and $m_2 = 0.037$.

(dimensions are in mm)
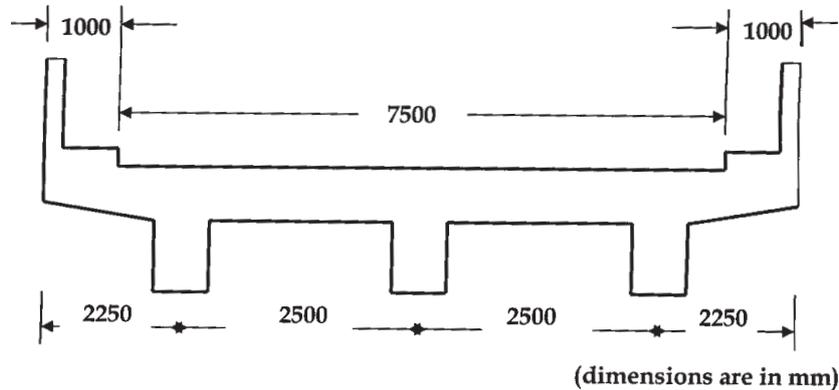
Fig.3

OR

Q4) For the reinforced concrete T-Beam deck slab bridge given in Q.3, design the central post - tensioned prestressed girder. Use M45 grade of concrete and high tension strands of 7ply 15.2 mm diameter having an ultimate tensile strength of 1500 N/mm². Use Fe415 steel for supplementary reinforcement. Consider loss ratio as 0.85. **[25]**

SECTION - II

Q5) a) Explain various gauge systems that exist in Indian Railways. Show the axle load train for main line broad gauge tracks. **[5]**

b) Explain concept of equivalent Udl for the train of axle loads when is the equivalent load concept is used. Discuss advantages of equivalent load. **[5]**

c) A small single span railway bridge has effective span of 8m. Design the suitable plate girder section for broad gauge branch line track. **[15]**

OR

Q6) a) Describe in brief the types of systems suitable for railway bridges such as Deck type, through type. **[5]**

b) The truss is as shown in figure. 6. It has to support a single line mainline broad gauge track, assuming suitable height for minimum compulsory clearance

i) What should be width between two trusses to accomodate broad gauge track **[5]**

ii) Design suitable member for U_2L_3 **[7]**

iii) Design cross bracing at top. **[8]**
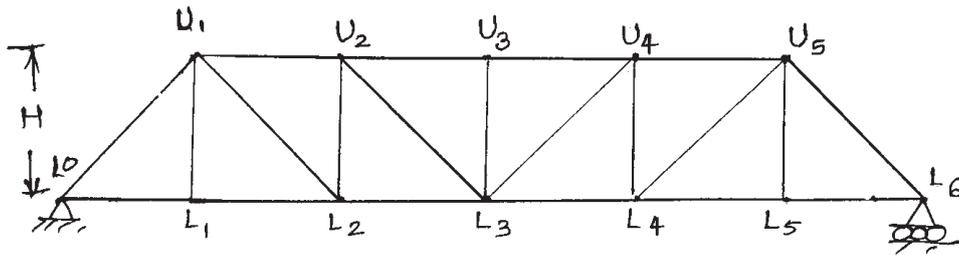
Fig 6 : 6 panels 4 m each = 24m

Q7) For the truss as shown in fig.6 and for equivalent uniformly distributed load.

a) Design the stringer beam between panel points. **[8]**

b) Design roller support at L_6. **[8]**

c) Design member $L_2 - L_3$. **[4]**

d) Discuss provision for design of elasto meric pad bearings for bridge. **[5]**

OR

Q8) A deck type bridge is to be used to support a single line broad gauge track. The trusses are directly under the track. Cross girders are at panel points; projected for 1.2 m outside the truss for foot way along the track. (fig 8).

a) Design members $U_1 - U_2$, $U_2 - L_2$, $L_1 - L_2$ **[9]**

b) Design bracing across the lower chord **[6]**

c) Design bearing at U_0 as rocker bearing. **[10]**
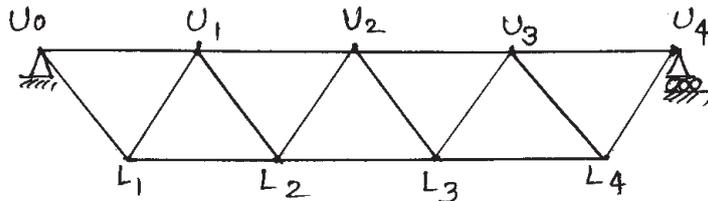
Fig. 8

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P549

[4064]-406

B.E. (Civil)

AIR POLLUTION AND CONTROL

(Sem. - I)(2008 Course) (401004(C)) (Elective - I)

Time : 3 Hours]   *[Max. Marks : 100*

Instructions to the candidates:

   1) *Solve Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6 from section I and Q.7 or Q.8, Q.9 or Q.10, Q.11 or Q.12 from section II*
   2) *Answers to the two sections should be written in separate books.*
   3) *Neat diagrams must be drawn wherever necessary.*
   4) *Figures to the right indicate full marks.*
   5) *Use of logarithmic tables, slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.*
   6) *Assume suitable data, if necessary.*

SECTION - I

Q1) a) Enlist Primary and Secondary meteorological factors influencing air pollution and explain each in brief.   **[8]**

   b) What is inversion? Explain in brief radiation and subsidence inversion.   **[8]**

OR

Q2) a) A thermal power plant burns 6 tonnes with 4.5% sulphur per hour and discharges through a stack of effective height 75 m. The average wind speed at top of stack is 6 m/sec. The atmosphere is slightly to moderately stable. Find   **[8]**

   i)   Maximum G.L.C. (Take $\sigma_z = 53m$, $\sigma_y = 88m$).

   ii) G.L.C. at 3 km downwind and 0.4 km cross wind distance (Assume at x = 3kms σ_y = 280 m, σ_z = 170 m). Assume any other data required.

   b) Explain effects of the following on plume dispersion :   **[8]**

   i)   Wind.

   ii) Atmospheric stability.

Q3) a) Enlist various methods of sampling particulate matter and explain any one in detail.   **[8]**

   b) Explain in detail ambient air sampling and stack sampling.   **[8]**

OR

Q4) a) Draw schematically a sampling train for stack sampling indicating the equipments required. **[8]**

b) What is iso kinetic sampling? Explain with a neat sketch. Why it is required? **[8]**

Q5) a) What are the different sources of odour? Explain any two methods to control odour pollution. **[9]**

b) Explain effects of indoor air pollutants with sources. **[9]**

OR

Q6) a) What is air cleaning system for control of indoor air pollution? Explain any two methods of mechanical ventilation. **[9]**

b) Explain method of measurement of odour. **[9]**

SECTION - II

Q7) a) With a neat sketch explain working principle of Electro Static Precipitator (ESP). Also state advantages and disadvantages of ESP. **[8]**

b) Calculate the particle cut size (dpc) for a gas flow rate of 7 m³/sec, particle density of 1500 kg/m³ and diameter of 10 m, if a multiple cyclone (64 cyclones each of diameter 240 mm) is used instead of a single large unit. Assume Ne = 5, Vi = 15 m/sec and μ_g at 20°C = 1.81 × 10⁻⁵ Kg/m.sec. **[8]**

OR

Q8) a) Explain working principle of a bag filter with a neat sketch. Also state advantages and disadvantages of bag filter. **[8]**

b) Explain the principle of gravity settling chamber and how smallest size of particles removed can be found out? **[8]**

Q9) a) Explain the important provisions made in "The Air (Prevention and Control of pollution) Act 1981". **[8]**

b) Explain tangible and intangible economic losses due to air pollution. **[8]**

OR

Q10) a) With a neat sketch explain land use planning to control air pollution. **[8]**

b) Discuss the main provisions in Environmental (Protection) Act 1986. **[8]**

Q11) a) What is Environmental Impact Assessment (EIA)? Explain the purpose of EIA. **[9]**

b) Discuss the role of general public in Environmental Clearance. **[9]**

OR

Q12) a) Explain method of Environmental Impact Assessment. **[9]**

b) Explain procedure for public hearing in India. **[9]**

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P550

[4064]-407

B.E. (CIVIL)

ARCHITECTURE AND TOWN PLANNING

(Revised 2008 Course) (Elective - I) (Sem. - I) (401004 (D))

Time : 3 Hours]   *[Max. Marks : 100*

Instructions to the candidates:

1) *Solve Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6 from section I; and Q.7 or Q.8, Q.9 or Q.10, Q. 11 or Q. 12 from section II.*
2) *Figures to the right indicate full marks.*
3) *Use seperate answer sheets for section I and section II.*

SECTION - I

Q1) a) Elaborate the importance of following two personnel in planning of cities **[8]**

  i) Architect

  ii) Town planner.

 b) Justify the statement "clean and healthy cities as outcome of open spaces & landscaping". **[9]**

OR

Q2) a) Explain how Architectural planning principles help in improving quality of Architecture. **[9]**

 b) i) State and explain soft landscape & hard land scape materials.

  ii) Enlist different garden styles & explain one.

[8]

Q3) a) Enlist and explain the factors in urban design & how effectively they are improving quality of life. **[9]**

 b) Justify the statement, "curbing the haphazard growth is a task in renewing the urban areas". **[8]**

OR

Q4) a) What do you understand by space enrichment? What are the different ways of it? **[9]**

 b) As a town planner how would you promote conservation of water body? How it would help in enhancing the aesthetics of town? **[8]**

Q5) a) Define sustainable Development. Mention the importance of use of sustainable materials in construction giving suitable examples. **[8]**

 b) What benefits a rated building will have over normal buildings? **[8]**

P.T.O.

Q6) a) Enlist the sustainable materials and technologies. Explain in detail two materials & any one technology. **[8]**

b) Define "Green Buildings". Explain any one method of rating the same. **[8]**

SECTION - II

Q7) a) Explain different theories of development of Town. Discuss advantages and disadvantages of different development patterns in detail. **[9]**

b) What is 'Garden city'? Elaborate its relevance in present Indian urban planning. **[8]**

OR

Q8) a) Discuss giving examples : 'Town planning scheme is a very effective tool for guiding existing development of towns'. **[9]**

b) Elaborate salient features of 'Special Township Act'. Discuss various effects of STA on urban development scenario of maharashtra. **[8]**

Q9) a) Explain legislative mechanism and various stages of preparation of development plan in maharashtra. **[9]**

b) Enumerate different traffic surveys to be carried out for preparation of D.P .Discuss any two of them in detail. **[8]**

OR

Q10) a) 'Zoning is an effective tool for controlling development in urban areas'. Discuss in detail. **[9]**

b) Explain various data to be collected and their presentation for 'Existing land use survey' in preparation of D.P. **[8]**

Q11) Write short notes (any four) **[16]**
   a) Advantages and disadvantages of Ribbon development.
   b) Green belts.
   c) Design brief about P.C.N.T.D.A.
   d) Special Economic zones.
   e) Components of regional plan.
   f) Application of G.I.S. in urban planning.

OR

Q12) a) Elaborate on Infrastructure planning for urban areas for different land forms as per UDFPI. **[8]**

b) Explain - salient features of land Aquisition Act. **[8]**

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P575

[4064]-500
B.E. (E&TC)
MICRO ELECTRO MECHANICAL SYSTEM & SYSTEM ON CHIP
(2008 Course) (404185(C)) (Elective - II) (Sem. - I)

Time : 3 Hours]   *[Max. Marks : 100*

Instructions to the candidates:

1) *Answer 3 questions from section I and 3 questions from section II*
2) *Answers to the two sections should be written in separate books.*
3) *Neat diagrams must be drawn wherever ncessary.*
4) *Figures to the right indicate full marks.*
5) *Use of electronic pocket calculator is allowed.*
6) *Assume suitable data, if necessary.*

SECTION - I

Q1) a) Define Transducer. How can we categories the transduction principles? **[8]**

b) Enlist the types of pressure sensors. Explain strain guage with respect to types and necessary expressions. **[8]**

OR

Q2) a) What do you mean by microsystem? Explain following micromachining techniques in detail. **[12]**

    i)   Bulk micromachining.

    ii)   Surface micromachining.

    iii)   LIGA.

    iv)   DRIE of BSOI.

b) What is load cell? Enlist various types of load cells and explain any one in detail. **[4]**

Q3) a) Write a short note on silicon pieroelectric crystal with respect to - **[10]**

    i)   Crystal model

    ii)   Pieroelectric materials.

    iii)   Deformation modes & operation.

b) Compare GaAs and silicon w.r.t micromachining characteristics. **[6]**

OR

Q4) a) Write a short note on "polymers for MEMS and microsystem". **[8]**

b) Write a short note on "Silicon - pieroresistor. **[8]**

Q5) a) What is thermoresistors? Explain 'Metal film thermoresistor and 'semiconducting thermoresistor' in detail. **[10]**

b) Write a short note on 'Rayleigh SAW' device with respect to **[8]**
   i) Transduction principle.
   ii) Fabrication
   iii) Applications.

<center>OR</center>

Q6) a) Explain Hall - magnetic microsensor in detail. **[8]**

b) Explain Grating type microspectrometer with respect to **[10]**
   i) Transduction principle.
   ii) Fabrication
   iii) Applications. (any 2)

<center>

SECTION - II
</center>

Q7) Write a short note on - **[16]**

a) Design for Testability.

b) Built in self Test.

<center>OR</center>

Q8) a) Write a short note on 'Faults and Fault simulation' **[8]**

b) Explain various design steps for Hardware/software codesign. **[8]**

Q9) a) What are the abstraction levels associated with synthesis tools? Explain in detail. **[8]**

b) What are the pros & cons of behavioural synthesis? **[8]**

<center>OR</center>

Q10) a) Explain various layout strategies for IC design. **[10]**

b) Explain any two routing techniques for IC design. **[6]**

Q11) a) Write a detail note on chip complexity with respect to **[9]**
   i) Impact into design.
   ii) Impact into production

b) Explain IC fabrication technology in detail for **[9]**
   i) Silicon bulk micromachining.
   ii) Silicon surface micromachining.
   iii) LIGA

<center>OR</center>

Q12) a) Explain MPEG - 2 encoder for digital media application **[8]**

b) Enlist various packaging technologies and explain each in detail. **[10]**

<center>♦♦♦♦</center>

P577

[4064]-506

B.E. (Instru & Control)
DIGITAL CONTROL
(2008 Course) (406262) (Sem. - I)

Time : 3 Hours]   *[Max. Marks : 100*

Instructions to the candidates:

1) *Answer 3 questions from Section - I and 3 questions from Section - II.*
2) *Neat diagrams must be drawn wherever necessary.*
3) *Figures to the right indicate full marks.*
4) *Your answers will be valued as a whole.*
5) *Assume suitable data, if necessary.*

SECTION - I

Q1) a) Determine the Z-Transform of (any two)   **[8]**

i) $\dfrac{4}{s^3(s+4)}$

ii) $\dfrac{2}{s(s+2)^2}$

iii) $\dfrac{1}{s(s+1)(s+2)}$

b) Explain in detail a basic building blocks of discrete time control systems. **[8]**

OR

Q2) a) Determine inverse Z - Transform of (any two)   **[8]**

i) $\dfrac{3z^2+2z+1}{3z^2-3z+2}$

ii) $\dfrac{2}{(2z-1)^2}$

iii) $\dfrac{z-0.4}{z^2+2z+1}$

b) Solve the following difference equation by using Z - Transform method. **[8]**
$x(k+1)+3x(k+1)+2x(k)=0$ where $x(0)=0; x(1)=1$.

Q3) Obtain the unit step response of system shown in fig. 1 with digital PID
controller $K_p = 1$, $K_I = 0.2$, $K_D = 0.2$ **[16]**
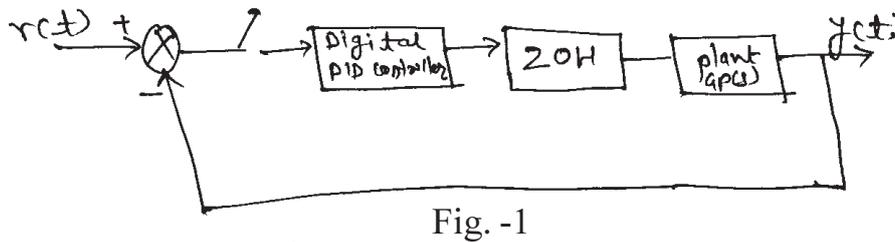
Fig. -1

Where $Gp(s) = \dfrac{1}{s(s+1)}$

OR

Q4) a) Obtain the pulse transfer function of system shown in fig. 2 using 1st
principle.   **[8]**
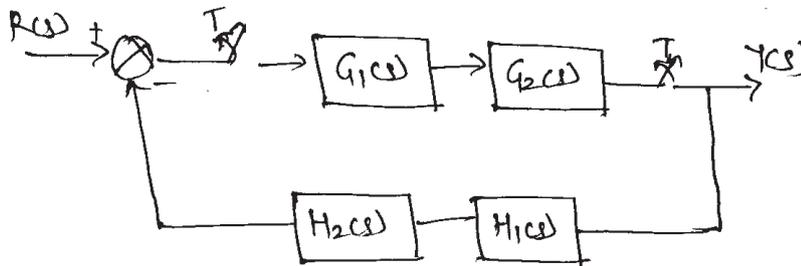
Fig. -2

b) Derive pulse transfer function of system as shown in fig. 3 using
1st principle.   **[8]**
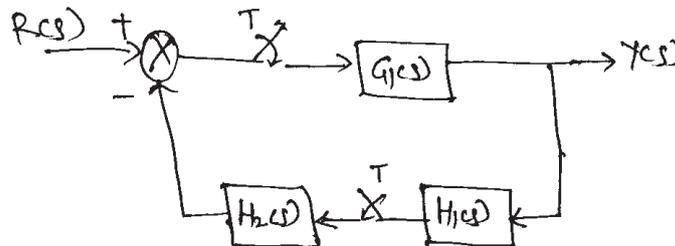
Fig. -3

Q5) Examine the stability of a system represented by the characteristic equation.

$p(z) = z^3 - 1.1z^2 - 0.1z + 0.2 = 0$ using

Jury's stability test and compare the results using Bilinear transformation and
Routh's array.   **[18]**

OR

Q6) a) Explain the stability of system represented by the characteristic equation.
$p(z) = z^4 - 1.2z^3 + 0.22z^2 + 0.066z - 0.008 = 0$
Using Jury's stability test.   **[8]**

b)   Find the range of 'K' for stability of the system using bilinear transformation

[10]
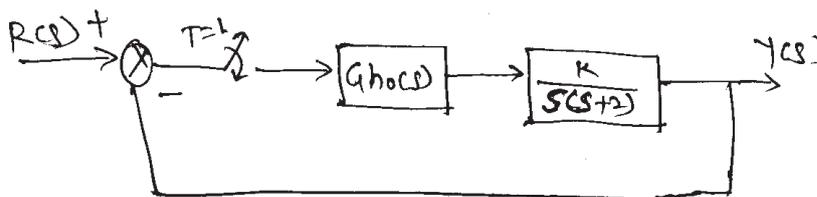
Fig.-4

SECTION - II

Q7) a) Derive the formula to obtain pulse transfer function for state model and use it to find PTF for the system.   [8]

$$X(k+1) = \begin{bmatrix} 0 & 1 & 0 \\ 0 & 0 & 1 \\ -1 & -4 & -6 \end{bmatrix} X(k) + \begin{bmatrix} 0 \\ 0 \\ 1 \end{bmatrix} u(k)$$

$$Y(k) = \begin{bmatrix} 2 & 5 & 1 \end{bmatrix} X(k)$$

b)   Diagonalize the plant matrix   [10]

$$G = \begin{bmatrix} 2 & 1 & 4 \\ 0 & 2 & 0 \\ 0 & 3 & 1 \end{bmatrix}$$

OR

Q8) a) Represent the system PTF   [10]

$$\frac{Y(z)}{X(z)} = \frac{(z+1)(z+0.5)}{(z+2)^2(z+3)} \text{ in}$$

i)   Controllable canonical form.

ii)   Jordan canonical form.

b)   Obtain Jordan form of the following plant matrix.   [8]

$$G = \begin{bmatrix} 0 & 0 & -2 \\ 0 & 1 & 0 \\ 1 & 0 & 3 \end{bmatrix}$$

Q9) a) Derive necessary and sufficient condition for state controllability and observability **[6]**

b) Investigate controllability and observability of **[10]**

$$X(k+1) = \begin{bmatrix} 0 & 1 \\ -0.4 & -1.3 \end{bmatrix} X(k) + \begin{bmatrix} 0 \\ 1 \end{bmatrix} u(k)$$

$$Y(k) = \begin{bmatrix} 0.8 & 1 \end{bmatrix} X(k)$$

OR

Q10) a) Derive the formula for state feed back gain matrix K to place the poles of the system at desired location via state variable feedback using Ackermann's formula and use the same to find the state feedback gain matrix K for the system. **[10]**

$$X(k+1) = \begin{bmatrix} 0 & 1 & 0 \\ 0 & 0 & 1 \\ -6 & -11 & -6 \end{bmatrix} X(k) + \begin{bmatrix} 0 \\ 0 \\ 1 \end{bmatrix} u(k)$$

to have deadbeat response.

b) State and derive the condition for complete state observability. **[6]**

Q11) For a linear discrete time system with state model

$$X(k+1) = Gx(k) + Hu(k)$$

$$G = \begin{bmatrix} 0 & 1 \\ -1 & 1 \end{bmatrix}; \quad H = \begin{bmatrix} 0 \\ 1 \end{bmatrix}$$

initial state $X(0) = \begin{bmatrix} 1 \\ 1 \end{bmatrix}$

Find optimal control sequence u(k) such that the following performance index is reduced to

$$J = \frac{1}{2} X^2(3) + \frac{1}{2} \sum_{k=0}^{2} X^2(k) + u^2(k) \text{ Also find } J_{min}$$ **[16]**

OR

Q12) Determine optimal control Law to minimize the following performance index

$$J = \frac{1}{2}\left[X(10)\right]^2 + \frac{1}{2}\sum_{k=0}^{9}\left[X^2(k) + u^2(k)\right]$$

for the system

$$X(k+1) = 0.3679\,x(k) + 0.6321u(k)$$

with $x(0) = 1$. Also find J_{min}.   **[16]**

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[4064] - 148

P1029

B.E. (Instrumentation & Control)

BUILDING AUTOMATION - I

(2003 Course) (406264) (Sem. - I) (Elective - I)

Time : 3 Hours]   *[Max. Marks :100*

Instructions to the candidates:

1) *Answers to the two sections should be written in separate books.*
2) *Neat diagrams must be drawn wherever necessary.*
3) *Figures to the right indicate full marks.*
4) *Assume suitable data, if necessary.*
5) *All questions are compulsory.*

SECTION - I

Q1) a) What is Building Automation? Discuss its importance **[8]**

b) Enlist types of FAS architecture. Explain any one? **[10]**

OR

Q2) a) Explain various field components of FAS with suitable diagram. **[10]**

b) Describe addressable fire alarm system. **[8]**

Q3) a) Discuss linear heat sensing cable. List its various application area. **[8]**

b) Explain NFPA guidelines for notification devices installation. **[8]**

OR

Q4) a) Discuss power supply requirement and battery calculations of FAS. **[8]**

b) What are the methods of Fire suppression? Explain any one fire alarm sprinkler system. **[8]**

Q5) a) What do you mean by zoning? Explain importance of zoning. **[8]**

b) Explain Intelligent FAS system. State its advantages. **[8]**

OR

Q6) a) Explain 2-wire & 4-wire smoke detector. **[8]**

b) Discuss manual initiating devices. **[8]**

SECTION - II

Q7) a) Draw and explain block diagram of access control systems. **[8]**

b) Define false acceptance & false rejection in biometrics. Discuss various biometrics used in Access Control System. **[10]**

OR

Q8) a) What is security system? Discuss need & applications of security system? **[10]**

b) Explain various categories of access control with suitable example. **[8]**

Q9) a) Explain automatic special sequential switching devices used in video processing devices **[8]**

b) Describe image capture, store and transmission phenomenon in camera. **[8]**

OR

Q10) a) Explain Quads used in video processing. **[8]**

b) Compare MPEG and MJEPG. **[8]**

Q11) a) What is perimeter intrusion? Discuss the importance & applications. **[8]**

b) Explain with suitable block diagram, architecture of PIDS. **[8]**

OR

Q12) a) Explain security system for vehicle. **[8]**

b) Explain technologies used for perimeter intrusion system. **[8]**

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P1032   **[4064] - 231**

B.E. (Polymer)

POLYMER STRUCTURE & PROPERTY RELATIONSHIP

(2003 Course) (Sem. - I) (409361)

Time : 3 Hours]   *[Max. Marks :100*

Instructions to the candidates:

1) Answers to section-I and section-II should be written on separate answer book.

2) Solve three questions from section-I and three questions from section-II.

3) Neat diagrams should be drawn whenever necessary.

4) Figures to the right indicate full marks.

5) Assume suitable data, if necessary.

6) Use of electronic pocket calculator is allowed.

SECTION - I

Q1) a) Write a short note on various bonds formed by carbon and with suitable examples explain their effect on polymer properties. **[8]**

b) Explain the importance of electro-negativity of elements present in structure in understanding properties of polymers. **[6]**

c) Comment "Silicon" bonds with various elements and their effect on properties. **[4]**

OR

Q2) a) Explain the effect of "Chlorine" as side group in various polymers. **[5]**

b) The positions of methyl (–CH$_3$) group in polymer structure alters its properties. True or False. Justify your answer. **[8]**

c) Why aromatic rings in main chain structure increase rigidity of polymer? **[5]**

Q3) a) Explain with examples how chemical groups affects the adhesive properties of polymer? **[6]**

b) Although LDPE and HDPE are purely hydrocarbons, the impact properties of both are different. Why? **[4]**

c) Type of bonds and their strength affects polymer properties. True or False. Justify the answer. **[6]**

OR

Q4) a) With suitable examples explain in detail the effect of morphology (i.e. crystalline and amorphous structure) on mechanical and thermal properties of polymers. **[9]**

b) Why is it difficult to apply epoxy adhesive onto PTFE surface? **[4]**

c) Although T_g of LDPE is less than room temperature, it is not rubbery in nature. Why? **[3]**

Q5) a) Explain in details how polymer properties get modified by incorporation of additives. **[10]**

b) Presence of polar groups affects electrical properties of polymer. Comment on the acceptability of the sentence. **[6]**

OR

Q6) a) Incorporation of plasticizer increases rigidity of polymeric products. True or False. Justify your answer. **[4]**

b) Molecular weight distribution plays an important role in polymer properties. Justify. **[6]**

c) What characteristics should a given polymer possess to make it "conducting polymer"? Give at least 2 examples of conducting polymers. **[6]**

SECTION - II

Q7) a) With suitable examples explain how freedom of rotation of bonds affects molecular flexibility. **[8]**

b) Explain the significance of supercooled state in crystallization process. **[6]**

c) Nylon 612 has more water absorption than Nylon66. Justify the statement. **[4]**

Q8) a) What is Liquid Crystalline Phase? Explain with suitable examples. **[7]**

b) Write a short note on Effect of Reheating on Crystallization. **[6]**

c) Explain how polystyrene and PVC can be made flexible. **[5]**

Q9) a) Explain the kinetic factors affecting crystallization. **[6]**

b) Briefly explain various techniques to determine percent crystallinity in the polymer? **[8]**

c) What do you understand by stress-induced crystallization? **[2]**

OR

Q10) a) What is Uniaxial and Biaxial orientation? Explain in detail how these affect polymer properties w.r.t. injection and blow moulded products. **[7]**

b) Explain the thermodynamic factors affecting crystallinity in polymers. **[6]**

c) State the structural requirements which facilitate crystallinity in polymers. **[3]**

Q11) a) Comment on the factors which contribute towards the intermolecular forces within polymer. **[10]**

b) Write a short note on London Dispersion (LDF) forces? Give suitable examples. **[6]**

OR

Q12) a) Explain the significance of solubility parameter for polymers? How is it found out? **[6]**

b) Give the effect of different types of intermolecular bonding forces on properties. **[10]**

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P1033

[4064] - 432

B.E. (Mech. S/W)

OPERATIONS RESEARCH

(2008 Course) (402064 B) (Elective - III) (Sem. - I)

Time : 3 Hours]   *[Max. Marks :100*

Instructions to the candidates:

    1) Answer three questions from section I and three questions from section II.

    2) Answers to the two sections should be written in separate answer books.

    3) Neat diagrams must be drawn wherever necessary.

    4) Figures to the right indicate full marks.

    5) Use of logarithmic tables, slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.

    6) Assume suitable data, if necessary.

SECTION - I

Q1) a) Explain in brief how operations research has been evolved. **[6]**

    b) Define linear programming. Give application of linear programming. **[6]**

    c) Write the dual of the problem. **[4]**

$$\text{Max } z = 3x_1 + 10x_2 + 2x_3$$

$$\text{Subject to: } 2x_1 + 3x_2 + 2x_3 \leq 7$$

$$3x_1 - 2x_2 + 4x_3 \leq 3$$

$$x_1 \geq 0 \ x_2 \geq 0 \ x_3 \geq 0$$

OR

Q2) a) Explain in brief methodology of operations research. **[6]**

    b) Solve the following linear programming problem by simplex method. **[10]**

$$\text{Maximize } z = 3x_1 + 4x_2$$

$$\text{Subject to: } x_1 + x_2 \leq 450$$

$$2x_1 + x_2 \leq 600$$

$$x_1 \geq 0 \ x_2 \geq 0$$

Q3) a) Differentiate between balanced & unbalanced transportation problem.**[4]**

b) Solve the following transportation problem and use stepping stone method to test optimality of solution. **[12]**

		D_1	D_2	D_3	D_4	supply
	I	2	3	11	7	6
Plant	II	1	0	6	1	1
	III	5	8	15	9	10
Requirement		7	5	3	2	

OR

Q4) a) Explain the role of branch & bound method to solve Travelling salesman problem. **[6]**

b) Five workmen of a factory are to be assigned to five jobs which can be done by any of them. Because of different number of year with the firm, the workers get different wages per hour. These are Rs 5 per hr for A, B, & C and Rs 3 per hr for D & E each. The amount of time taken by each employee to do a job is given in table below. Obtain the assignment pattern that **[10]**

		workmen				
		A	B	C	D	E
	I	7	9	3	3	2
	II	6	1	6	6	5
Job	III	3	4	9	10	7
	IV	1	5	2	2	4
	V	6	6	9	4	2

i) Minimizes the total time taken &

ii) Minimizes the total cost of getting five units of work done.

Q5) a) Discuss what is ABC analysis in inventory control. **[6]**

b) The production department for a company requires 3600 kg at raw material for manufacturing a particular item/year. It has been estimated that cost of placing an order is Rs 36 and cost of carring an inventory is 25% of investment in inventories. The price is Rs 10/kg. The purchase manager wishes to determine an ordering policy for raw material. Determine: **[12]**

i) EOQ

ii) Minimum yearly cost

Q6) a) Write short note on sequencing of 'n' job on 'm' machines.　　　**[6]**

b) A pharma company consumer annual 6000 kg of chemical costing Rs 5/kg. Ordering cost is Rs 25 and carring cost is 6% per year/kg. Of average inventory. Find EOQ and total inventory cost. (including cost of chemicals) of the supplier offers discount of 5% on cost price for a single order of annual requirement. Should the factory accept it.　　**[12]**

SECTION - II

Q7) a) Define the following:　　　**[6]**

　　　i)　　Suddle point

　　　ii)　　Payoff matrix

　　　iii)　Dominance

b) Reduce the following game by Dominance and determine the value of game.　　　**[10]**

Person B

		1	2	3	4
Person	1	3	2	4	0
A	2	3	4	2	4
	3	4	2	4	0
	4	0	4	0	8

OR

Q8) a) Write a brief note on replacement analysis.　　　**[6]**

b) A firm is considering replacement of machine, the maintanance cost & resale value per year of m/c whose purchase price is Rs 7000 is given below.　　　**[10]**

Year	1	2	3	4	5	6	7	8
Maintanance cost (Rs)	900	1200	1600	2100	2800	3700	4700	5900
Resale value (Rs)	4000	2000	1200	600	500	400	400	400

When should the m/c be replaced.

Q9) a) Explain with suitable examples about the queue. Why do you consider the study of waiting line as an important aspect. **[6]**

b) There is a congestion of the plat form of a railway station. The trains arrive at the rate of 30 trains per day. The waiting time for any train to hump is expermentally distributed with an average of 36 minutes. Calculate **[10]**
   i) Mean queue size
   ii) The probability that queue size exceeds 9.

OR

Q10) a) Write short note on Goal & Dynamic programing. **[6]**

b) Solve the following nonlinear programming problem. **[10]**
   $Z \min = 4x_1 + 9x_2 - x_1^2 - x_2^2$
   Subject to: $4x_1 + 3x_2 = 15$
   $3x_1 + 5x_2 = 14$
   $x_1, x_2 \geq 0$

Q11) a) Differentiate between CPM & PERT. **[6]**

b) A small maintanance project consists of following 12 job. Draw the network of project. Summarize CPM calculate in tabula form. Determine critical path. **[12]**

Job	1-2	2-3	2-4	3-4	3-5	4-6	5-8	6-7	6-10	7-9	8-10	9-10
Duration	2	7	3	3	5	3	5	8	4	4	1	7

OR

Q12) a) Discuss cost aspects & crushing of network. **[6]**

b) The following table shown activities, their normal & crush duration, & crush slop. Their overhead cost is Rs 160. Calculate normal duration, normal cost of project. Find lowest cost duration company is intrested in finding out total cost of project if all activities are crushed. **[12]**

Activity	Normal duration	Crush duration	Crush slop
1-2	6	4	80
1-3	8	4	90
1-4	5	3	30
2-4	3	3	–
2-5	5	3	40
3-6	12	8	200
4-6	8	5	50
5-6	6	6	–

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P1034

[4064] - 469

B.E. (Electrical)
EXTRA HIGH VOLTAGE TRANSMISSION
(2008 Course) (Sem. - I) (403144 (C)) (Elective - II)

Time : 3 Hours]   *[Max. Marks :100*
Instructions to the candidates:
   1)   Answer any one question from each unit.
   2)   Answer three questions from section I and three questions from section II.
   3)   Answers to the two sections should be written in separate books.
   4)   Neat diagrams must be drawn wherever necessary.
   5)   Figures to the right indicate full marks.
   6)   Use of logarithmic tables, slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.
   7)   Assume suitable data, if necessary.

SECTION - I
Unit - I

Q1) a) Derive the travelling wave equations for the lossless lines and from the solution of travelling wave equations prove that it consists of two waves travelling in the opposite directions.   **[10]**

   b) Write note on attenuation and distortion of travelling waves.   **[6]**

<div align="center">OR</div>

Q2) a) A power of 12000 MW is required to be transmitted over a distance of 1000 km. At voltage levels of 400 kv and 750 kv determine: **[8]**

   i)   Possible number of circuits required with equal magnitudes for sending and receiving end voltages with 30º phase difference.

   ii)   The current in each circuit and total current

   iii) Power loss in each circuit and total power loss.

   Take line reactance as 0.327 ohm/km and 0.272 ohm/km for 400 kv and 750 kv lines respectively. Take line resistances 0.031 ohm/km & 0.0136 ohm/km for 400 kv & 750 kv line respectively.

   b) Write note on mechanical considerations in line performance.   **[6]**

   c) Of the following transmission voltages (given in kv) used in the world, which ones are used in India at present:

   66, 132, 169, 220, 275, 345, 400, 500 - 525, 735 - 765, 1000, 1150. **[2]**

Unit - II

Q3) a) Derive the expression for inductance matrix of multiconductor ehv lines consisting of n conductors. which are self inductances and mutual inductances? **[8]**

b) For fully transposed three phase ac line derive the expressions for sequence inductances in terms of self and mutual inductances of completely transposed lines. **[8]**

OR

Q4) a) The height of conductors of 3 phase 400 kv horizontal line is 15 meter from the ground. The phase separation is 11 meter. Conductor is 2×3.18 cm diameter and bundle spacing is 45.72 cm. Calculate the matrix of inductances per km for untransposed configuration. Also find the same when there is complete transposition. **[8]**

b) A moose conductor has the following details. **[6]**

outer diameter is 31.8 mm. Area of aluminium is 517.7 mm^2. Calculate the resistance of 1 km of a double. Moose bundled conductor at 50°C, given that ρ for aluminium 2.7×10^{-8} ohm meter at 20°C and temperature resistance coefficient of aluminium 4.46×10^{-3}/°C at 0°C. (Increase length by 5% for stranding).

c) State the expression for equivalent radius or GMR of bundle conductors consisting of n subconductors in terms of bundle radius R and radius r of each subconductor. **[2]**

Unit - III

Q5) a) Prove the following property. **[8]**

"Given a positive charge Q_1, and sphere of radius R with Q_1, located external to the sphere, whose center is at distance S_1 from Q_1, the sphere can be made to have zero potential on its surface if a charge of opposite polarity and magnitude $Q_2 = Q_1 R/S_1$ is placed at distance $S_2 = R^2/S_1$ from the center of given sphere towards Q_1".

b) A single conductor of ehv transmission line is strung above the ground is used for experimental purposes to investigate high voltage effects. The conductor is expanded ACSR with diameter of 0.0625 meter and line height is 21 meter above the ground.

Calculate the voltage to ground which will make its surface voltage gradient equal to corona inception gradient given by peek's formula

$$E_0 r = \frac{30}{\sqrt{2}} \frac{1}{m} \left(1 + \frac{0.301}{\sqrt{r}}\right) kv/cm. \text{ rms; where } m = 1.3 \text{ required for}$$

stranding effect and conductor radius is in cm. **[6]**

c) A charge of 10 micro coulomb is placed at a distance 2 meter from the center of sphere of radius 0.5 meter. Calculate the magnitude, polarity and location of a point charge Q_2 which will make the sphere at zero potential. **[4]**

OR

Q6) a) For horizontal configuration of phases of 3 phase ac line, derive Mangoldt formula. **[8]**

b) A single conductor of 5 cm diameter is strung inside an outer cylinder of 2 meter radius. The corona inception gradient on the conductor is given by formula

$$E_0 = 21.92 \left(1 + \frac{0.0308}{\sqrt{r}}\right) kv/cm, \text{ where } r \text{ is radius of conductor in meter}$$

Find. **[5]**

i) E_0

ii) Corona inception voltage in Kv, rms

iii) The gradient factor

c) Find the expression for maximum and minimum voltage gradient on the surface of subconductor of 2 conductor- bundle. Q coulomb is the charge of bundle. Neglect the effect of charges of conductors of other phases and the charges of image conductors. **[5]**

SECTION - II
Unit - IV

Q7) a) Derive the expression for electrostatically induced voltage V_4 on any conductor of unenergized three phase ehv circuit of a double circuit line. The three phase voltages of three conductors of energized line are denoted as V_1, V_2 and V_3. **[10]**

b) Write note on effects of electrostatic field of ehv line on humans, animals and plants. **[6]**

OR

Q8) a) Write note on ungrounded shield wires tied to the tower top. **[6]**

b) Draw the sketch of vehicle parked parallel to extra high voltage line under it. State the equation for finding out the capacitance of vehicle which is formed due to electrostatic induction. **[4]**

c) According to some international organizations and scientists state the harmful effects of power frequency magnetic fields on human health. What is useful effect? **[6]**

Consider the three phase ehv transmission line circuit on a tower with horizontal configuration and state the direction in which component of total magnetic field induced is entirely zero at the ground surface.

Unit - V

Q9) a) With neat diagram explain the operation of 3 phase full wave bridge circuit. State what is meant by commutation overlap and firing delay angle. Draw the waveforms of three phase ac voltages and output voltage Vd for firing angle of 0°. **[10]**

b) What is the effect of source inductance on the output of a bridge rectifier? Draw the equivalent circuit to show the expressions of commutating resistance and output voltage. **[6]**

OR

Q10) a) For 3ϕ full wave bridge rectifier circuit derive expression for output dc voltage and dc current at firing delay angle α. Assuming continuous current. State the magnitude of reactive power drawn for $\alpha = 90°$. **[8]**

b) State and explain the main components of HVDC system. Draw the diagram for identifying these main components. **[8]**

Unit - VI

Q11) a) State with reasons the requirements of satisfactory operation of HVDC link. **[9]**

b) Compare individual phase control and equidistant pulse control systems of firing angle control of converters. **[9]**

OR

Q12) a) Discuss the problems associated with weak ac system in operation of dc system. State the solutions to these problems. **[10]**

b) What is meant by weak ac system. Explain the terms "short circuit ratio" and "effective short circuit ratio" of ac system. What is meant by effective inertia constant? **[8]**

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P1035

[4064] - 546

B.E. (Petroleum Engineering)
PETROLEUM FORMATION EVALUATION
(2008 Course) (Sem. - I) (412382)

Time : 3 Hours]   *[Max. Marks :100*

Instructions to the candidates:

1) *All questions are compulsory.*
2) *Answers to the questions of both the sections should be written in separate answer books.*
3) *Draw neat diagrams wherever necessary.*
4) *Assume additional data, if required.*

SECTION - I

Q1) a) Log below shows record for GR, SP and resistivity changes for every two feet.
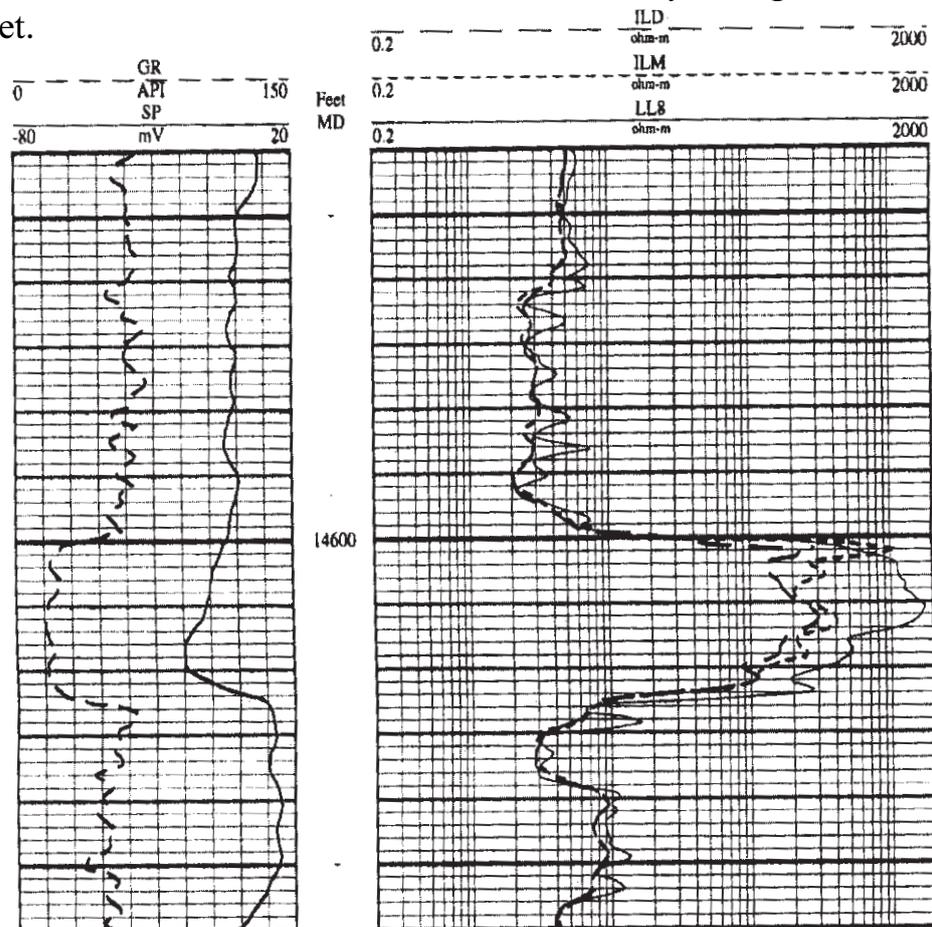
Interpret the changes shown by log from 14600 feet to 14630 feet. Give your comments for this depth zone. Why GR curve is different than SP? **[10]**

b) An oil field has a mean surface temperature of 30 ºC in a well drilled in that area. The bottom hole temperature at 4000 m is 110 ºC. what is the average geothermal gradient?

What would be the temperature at 6000 m assuming an increase of 5% in geothermal gradient at depth more than 4000 m? **[5]**

OR

Q2) a) Describe borehole environment. What is invasion profile? Explain empirical relationship between different zones and fluids. **[10]**

b) Distinguish between low resistivity pay and low contrast pay? **[5]**

Q3) Explain important resistivity logging methods with the help of neat sketches. **[15]**

OR

Q4) Describe different types of sources used in neutron logging. Explain the principle of any one type of neutron logging tool with the help of a sketch. **[15]**

Q5) Answer any four of the following: **[20]**

a) Objectives of formation evaluation

b) Techniques used to understand geometry of wellbore.

c) Detection of abnormal formation pressure

d) Dual water model

e) Temperature logging.

f) Depth of investigation of various resistivity tools.

g) Factors influencing drilling time

h) Limitations of induction tools in the recognition of bed resolution / thickness

SECTION - II

Q6) a) Write about understanding of different formation parameters using following logs : **[10]**

    i)   Density - Neutron logs

    ii)   LDT (Litho - density) logs

    iii) TDT (Thermal Decay Time) logs

    iv) Sonic logs

b) What problems occur in shaly reservoir while determination of lithology and porosity. **[5]**

OR

Q7) a) A record of logs is given from 1890m 1938m by GR, SP (first track), LLS and LLD (second track), and RHO and NPHI (third track). Carefully observe the log signatures and their relationships
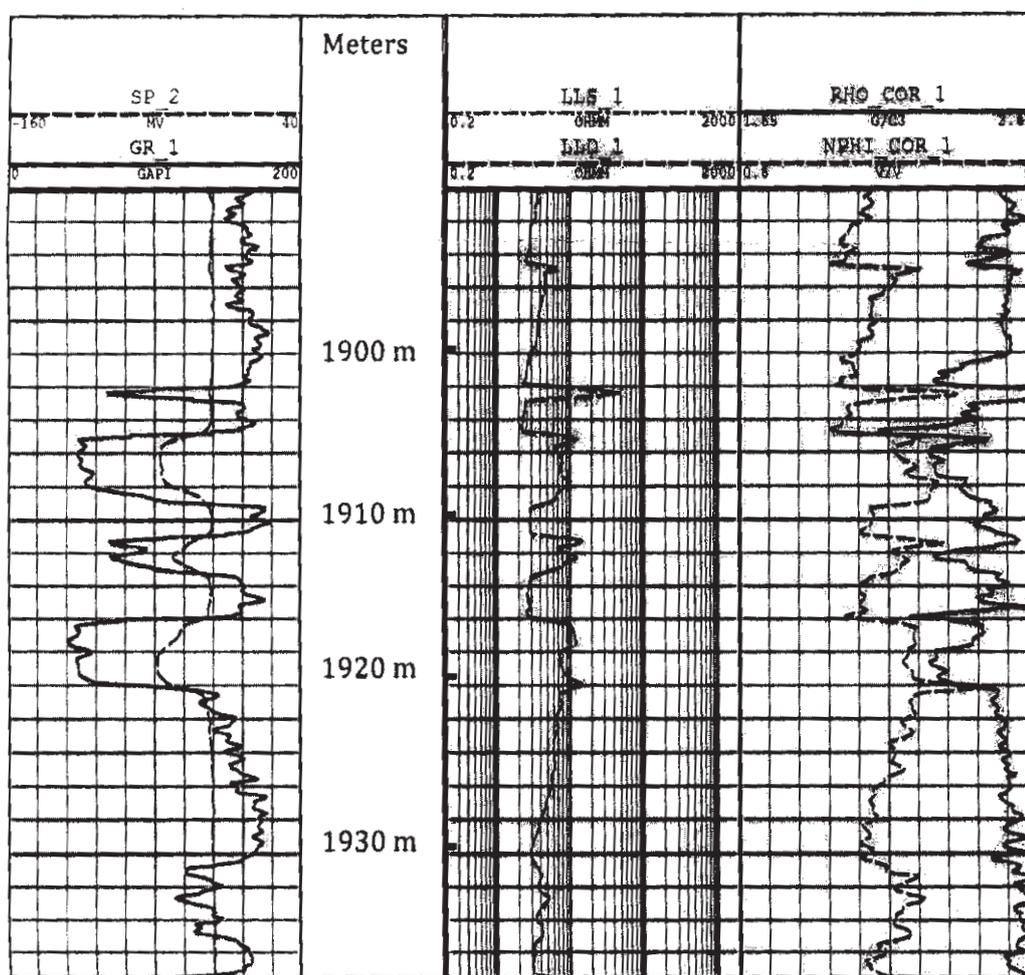
Interpret the lithology and cross relations shown by different signatures. Do you find any clean formation in this log? Justify your answer with suitable comments. **[10]**

b) How is movable hydrocarbons and bed boundary recognized? **[5]**

Q8) a) How will you detect and interpret oil and gas shows during mud logging?

[10]

b) Which logs may be used for the recognition of gas and porosity? **[5]**

OR

Q9) a) Interpret the following SP/GR log curve patterns.
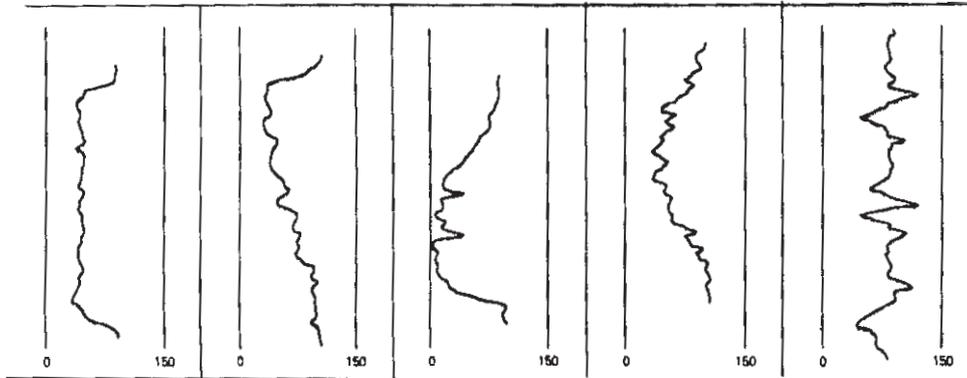
Comments about depositional environment giving reasons **[10]**

b) A clean sand formation/ horizon penetrated by a well contain water, oil and gas. Above and below the sand horizon occurs low resistivity shale. Resistivity of the formation below oil - water contact is 0.63 Ohm.m and that of above oil - water contact is 6.8 Ohm.m. If the Formation Water Resistivity is 0.02 Ohm.m with default values of $A = 0.81$, $m = 2$ and $n = 2$, calculate the porosity of the horizon. **[5]**

Q10) Answer any four from the following: **[20]**

a) What are the different physical properties of clays that are relevant to log Interpretation?

b) Explain the empirical relationship between water resistivity, porosity and water saturation.

c) Explain important types of cross plots and their applications

d) What are the different methods of calculating reservoir parameters?

e) What is the importance of examination of well cuttings and core analysis?

f) How are fractured reservoir detected?

g) Importance and methods to determine net to gross thickness

h) Recognition of porous and non porous carbonates

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P1036

[4064] - 548

B.E. (Petroleum Engineering)
PETROLEUM EXPLORATION
(2003 & 2008 Course) (412384 A) (Elective - I) (Sem. - I)

Time : 3 Hours]   *[Max. Marks :100*

Instructions to the candidates:

1) *Answers to the questions should be written in separate answer books.*
2) *Neat diagrams should be drawn wherever necessary.*
3) *Assume additional data, if necessary.*

SECTION - I

Q1) a) Explain with the help of suitable diagrams characteristic curves for gravity anomaly of a thin horizontal slab and a cylinder. **[9]**

b) Draw and describe in brief Schlumberger array method for vertical electrical resistivity sounding survey. **[6]**

OR

Q2) a) Details of a gravity survey conducted in a drill hole are specified in the figure given below. **[8]**

Figure for Q.2.A.
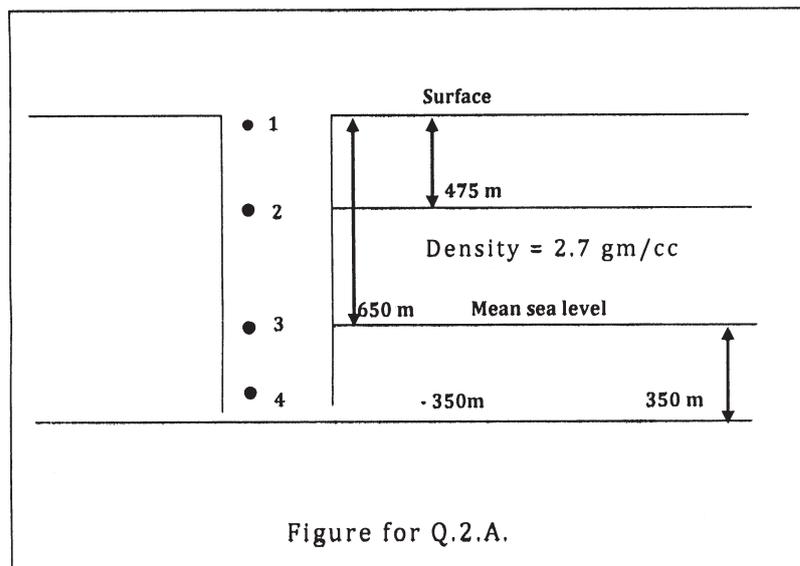
Calculate the free air and Bouger corrections for measured "g" at positions 1, 2, 3, 4. Station no. 3 is a base station. Loss of mass due to drill hole is negligible. Density is 2.67. gm /cc.

b) Calculate the Z_A, H_A, F_A for a magnetic survey which was carried out to locate a buried chamber with following details as shown in figure below. **[7]**

Figure for Q.2.B.
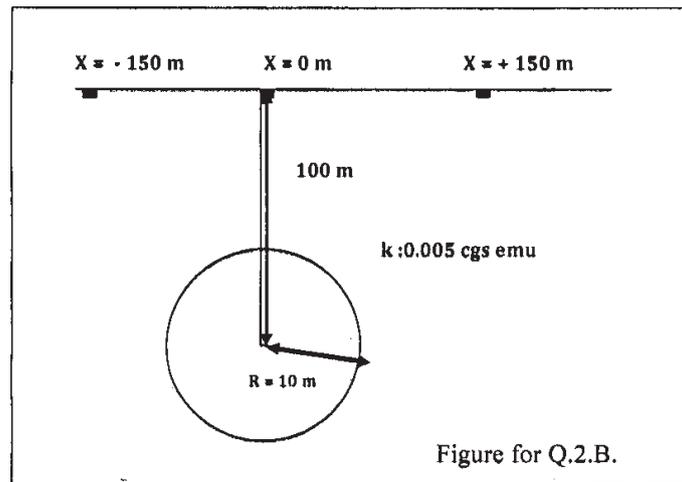
Q3) a) Data given in table one is a record of a seismic reflection survey. For this geophones are aligned from east to west. **[5]**

Table 01			
Distance from shot in (m)	Reflection #1 (ms)	Reflection #2 (ms)	Reflection #3 (ms)
3	40.5	102.5	116.8
13	47.7	103.1	117.2
23	61	104.4	118
33	77.2	106.3	119.2
43	94.9	108.9	120.9
53	113.3	112.1	123
63	132.2	115.8	125.5
73	151.4	120	128.4
83	170.8	124.6	131.6
93	190.3	129.7	135.1
103	209.9	135.1	138.9
113	229.5	140.8	143

Prepare time-distance curve for reflection #1. reflection #2, and reflection #3.

V_{RMS} for Reflection #1 (ms) is 540 m/s, Reflection #2 (ms) is 2250 m/s and for Reflection #3 (ms) is 2770 m/s. Using the V_{RMS} given, calculate the depth of each reflector. Interpret the subsurface geology revealed in the curves. (Use cm scale graph paper).

b) How does the seismic reflection method work? What is the difference between 2D and 3D seismic? What causes bright spots and flat spots? **[10]**

OR

Q4) a) Explain Seismic facies analysis based on the external shapes of seismic bodies, and the internal texture of rock bodies with the help of suitable examples. **[10]**

b) What is Normal Moveout (NMO)? How is normal move out correction applied to a horizontal and a dipping reflector? **[5]**

Q5) Answer <u>any five</u> from the following: **[20]**
  a) Seismic impedance.
  b) Time Lapse Seismic.
  c) AVO
  d) Corrections in magnetic surveying.
  e) Wenner Configuration in electric surveys.
  f) Direct Indications of Hydrocarbons.
  g) Elastic properties of rocks.
  h) Vertical Seismic profiling
  i) Synthetic seismogram
  j) Scintillation counter

SECTION - II

Q6) a) Explain in brief the steps involved in the quantitative basin analysis with the help of a flow chart. **[10]**

b) Following table is given to recognize effects of overburden on porosity.
[5]

Lithology	Original porosity, ϕ_0	Compaction constant, k
Sandstone	0.40	1.20
Siltstone	0.53	2.18
Shale	0.70	2.38
Limestone	0.74	1.30

$$\frac{1}{\phi(y)} = \frac{1}{\phi_o + ky}$$

Where, ϕ_0 is original porosity
k is the compaction coefficient
y is the depth (km)

Use the POROSITY-DEPTH formula given above to calculate the porosity of the following "typical units" at 4 km depth.

Which lithology had the greatest relative change in porosity from the surface to 4 km? Why?

Q7) a) What is a petroleum system? Explain spatio-temporal relationship in a petroleum system. What is a critical moment? **[10]**

b) Describe the steps involved in the exploration of a new basin leading to the drilling of a wildcat well. What basic questions about subsurface need answers? **[5]**

Q8) a) What are petroleum seepages? What are direct and indirect methods of their detection? **[5]**

b) Figure given below shows presence of many plays in a license area controlled by dependent and independent parameters to decide the value of reservoir. **[10]**

Design a template for the creation of a 3D Reservoir model taking into consideration the foresaid dependent and independent parameters.

Also list out information on attributes to be included in the Data Base Management Systems (DBMS), which would allow a means to review the reservoir model and update the same.
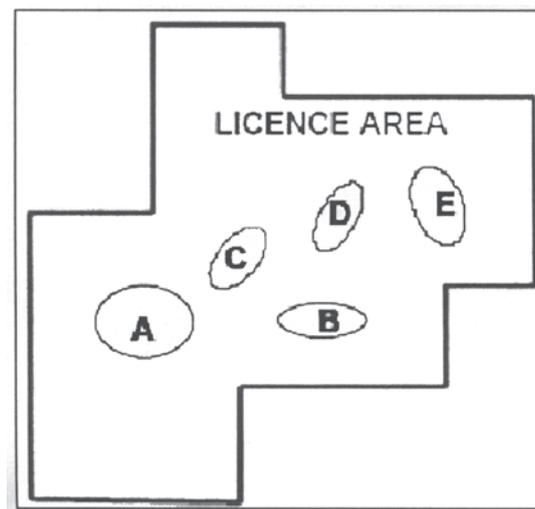
How this database is useful in the creation of different maps?

OR

Q9) a) What are direct hydrocarbon detection methods used in the geochemical exploration designed to detect presence of hydrocarbons in soils, near-surface sediments, seafloor sediments, and waters. **[10]**

b) What are the basic tools in the recognition of a structural play? **[5]**

Q10) Answer <u>any five</u> of the following: **[20]**

a) Impact of diagenesis on stratigraphic trapping mechanism.

b) How is deterministic approach in reserves estimation different than probabilistic approach?

c) What are biomarkers?

d) Reserves estimation using volumetric estimation.

e) How does asymmetry of folding control the area of reservoir during calculation of volumetric reserves?

f) Continuous accumulation system.

g) Errors in oil and gas reserves estimation

h) Raster and vector structures

i) Principles of surface geochemical exploration.

j) Static and dynamic maps.

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P1037   **[4064] - 554**

B.E. (Petroleum Engineering)

NON CONVENTIONAL HYDROCARBON RESOURCES

(2008 Course) (Elective - II) (Sem. - I) (412385 (C))

Time : 3 Hours]   *[Max. Marks :100*

Instructions to the candidates:

1) *Answers to the two sections should be written in separate books.*
2) *Neat diagrams should be drawn wherever necessary.*
3) *Figures to the right indicate full marks.*
4) *Assume additional data if necessary.*

SECTION - I

Q1) a) Explain with the help of neat diagram the continuous accumulation system. How does it different than conventional system? **[10]**

   b) What are the petrophysical characteristics of a tight reservoir? **[5]**

OR

Q2) a) Give in brief Systematic Workflow Process for Heavy-Oil Characterization. **[10]**

   b) Calculate the formation volume factor and bubble point of a heavy oil using following data: **[5]**

   API = 15º

   Gas gravity = 0.65

   GOR = 7 m³/ m³

   Reservoir temperature = 25ºC

Q3) a) Draw a schematic diagram of CBM reservoir to understand heterogeneity. How does it different from Shale Gas? **[10]**

   b) How is shale classified in to different hydraulic units based on petrophysical observations? **[5]**

OR

Q4) a) A gas has a specific gravity of 0.75 and exists at 70ºF. What would be the pressure above which hydrates could be expected to form? **[5]**

b) The following sorption isotherm data is for a coal sample. **[10]**

P	V
76.0	77.0
122.0	113.2
205.0	159.8
221.0	175.0
305.0	206.4
504.0	265.3
507.0	267.2
756.0	311.9
1001.0	339.5
1108.0	340.5

Calculate the Langmuir isotherm constant Vm and the Langmuir pressure constant b.

Q5) Answer <u>any four</u> from the following: **[20]**

a) Biodegradation of oil.

b) TOC % in Tight Gas sand, shale gas and CBM.

c) Gas desorption and diffusion in recovery of CBM

d) Dissociation of Gas hydrates

e) Simplified Process Schematic for Fischer - Tropsch Coal-to-Liquids Systems.

f) Gas storage mechanism in CBM

g) Classifications of shale gas system

h) Hydrate types and formers

i) Carbon Capture and sequestration.

SECTION - II

Q6) a) A 2000 ft. long horizontal well is to be drilled in a reservoir with vertical permeability of about one half of the horizontal permeability. The horizontal well is drilled on 160 acre spacing. Other reservoir parameters are as follows. **[10]**

K_h = 5 Md, h = 50 ft, uo = 0.3 cp, βo = 1.2 RB / STB, Rw = 0.365 ft

Calculate horizontal well productivity for K_v / K_h = 0.5

Show that Poisson's ratio is always between 0 and 0.5.

b) Discuss chemo-poro-thermo-elastoplastic behaviour of rock deformation in brief. **[5]**

OR

Q7) a) Write a detailed note on hydraulic fracturing operations in shale gas development. **[10]**

b) Calculate pressure drop in skin zone in vertical and 1000 feet long horizontal well. Following is the data for same. **[5]**

The well test show skin factor is +1 for vertical and horizontal well. Reservoir properties are S = +1, h = 30 ft, qh = 2500 BOPD,

Kv = Kh = 10md, qv = 1000 BOPD,

uo = 0.8 cp, and βo = 1.06 RB/STB.

Q8) a) Discuss in brief different types of fracturing fluids and additives. **[10]**

b) A gas reservoir has the following characteristics: **[5]**

A = 2500 acres,   h = 25 ft, ϕ = 0.12,

Swi = 25%,   T = 160 °F   pi = 2600 psi

p	z
2600	0.82
1000	0.88
400	0.92

Calculate cumulative gas production and recovery factor at 1000 and 400 psi.

Q9) Answer <u>any four</u> from the following: [20]

 a) Inhibition of hydrate formation,

 b) Sources of liquid in a flowing gas well,

 c) NORM in shale,

 d) Treatment for produced water,

 e) Elastic properties of shale

 f) Physical properties of hydrates,

 g) Explain with the help of schematic diagrams capillary pressure and relative permeability relationship in conventional and low permeability reservoir.

 h) Dual water system in shale

 i) CBM in India

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P1038   **[4064] - 576**

B.E. (Polymer)

MOLD AND DIE DESIGN - I

(Sem. - I) (2008 Pattern) (409362)

Time : 4 Hours]   *[Max. Marks :100*

Instructions to the candidates:

1) *Answer three questions from section I and three questions from section II.*

2) *Answers to two sections should be written on separate answer books.*

3) *Figures to the right indicate full marks.*

4) *Use of pocket calculators is allowed.*

5) *Assume suitable data, if necessary.*

SECTION - I

Q1) Design a 2 cavity 2 plate mold for the component in fig 1. Draw at least 2 views with one sectional view to bring out the details of the feed, cooling and ejection systems. Illustrate the relevant design calculations.   **[35]**

OR

Q2) Design a 2 cavity 3 plate mold for the component in fig 2. Draw at least 2 views with one sectional view to bring out the details of the feed, cooling and ejection systems. Illustrate relevant design calculations.   **[35]**

Q3) With a neat sketch, explain the concept of sleeve ejector.   **[6]**

OR

Q4) With a neat sketch, explain any one cooling system used for cooling of core inserts.   **[6]**

Q5) a) List the various design formulae used to find the pressure drop through a rod die. **[4]**

b) Explain the terms **[5]**

   i) Inline pipe die

   ii) Cross head pipe die

<div align="center">OR</div>

Q6) Draw a neat labelled sketch of a blown film die. Explain its constructional features in brief. **[9]**

<div align="center">

SECTION - II

</div>

Q7) a) Explain in details, the process of annealing or normalizing of steel. Write down its application. **[8]**

b) Derive an expression for machining time in milling. **[4]**

c) A typical grinding wheel is specified as $300 \times 30 \times 35$ WA 36 M5S17. Discuss in detail the mean of this specification. **[4]**

<div align="center">OR</div>

Q8) a) Discuss any one case hardening process in detail. Which components of an injection mold are case hordened and why? **[6]**

b) With a neat sketch explain tool geometry of a single point cutting tool. **[4]**

c) Describe any 2 of the following operations **[6]**

   i) polishing   ii) lapping

   iii) grinding   iv) honing

Q9) a) Explain how flatness of a surface is tested by interferometer technique. **[6]**

b) Derive an expression for pitch diameter or effective diameter of a screw thread using three wire method. **[8]**

c) The included angle of a ISO metric coarse thread is 60º and pitch 2mm. Calculate the best wire size for this thread. **[4]**

<div align="center">OR</div>

Q10) a) Write short note on any two: **[6]**

      i)   Types of fits with neat sketches.

      ii)   Tolerance accumulation

      iii)   Geometric characteristics and symbols.

    b) Explain with examples different methods of expressing tolerances on drawing which is the preferred method & why. **[5]**

    c) A hole and shaft system has the dimensions 60H8/08. The standard tolerance in microns is given by $i = 0.45 \sqrt[3]{D} + 0.001D$. The diameter 60 falls in range of 50 to 80 mm. The multiplier for grade 8 is 25. The fundamental deviation for shaft is given by $(95 + 0.8\ D)$ microns. Sketch the fit and show these upon the actual dimensions of the hole and shaft. Indicate the type of fit clearly. **[7]**

Q11) a) Explain constructional features of spigotted guide pillar with a neat sketch. **[8]**

    b) Explain the term runner efficiency. Illustrate with examples. **[8]**

<div align="center">OR</div>

Q12) a) With a neat sketch, explain the constructional features of a subsurface gate and rectangular edge gate. **[7]**

    b) Indicate the various factors considered while gate, designing. What is gate balancing. **[4]**

    c) With a neat sketch, explain the constructional features of a flat seating and spherical seating sprue bush. **[5]**
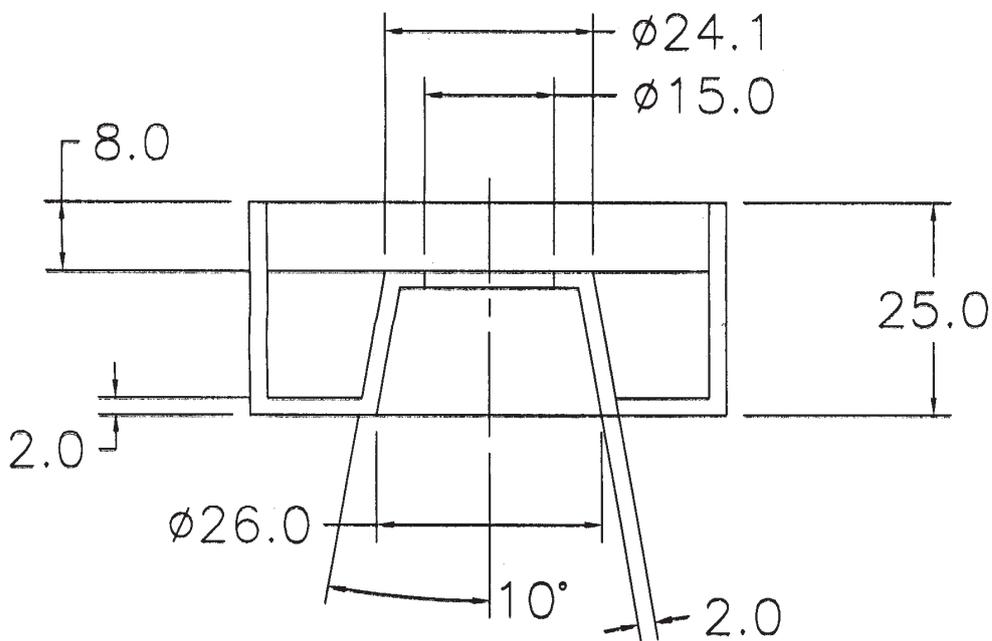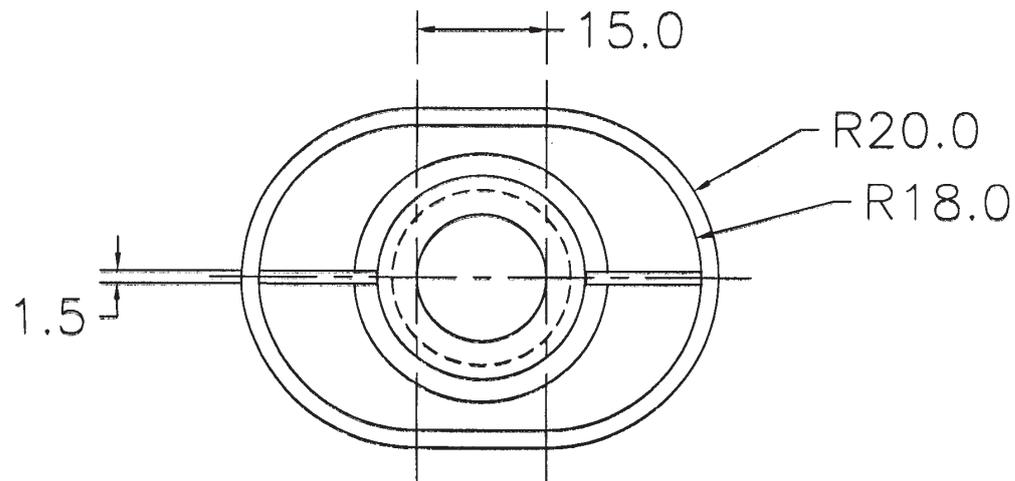
ALL DIMENSIONS ARE IN mm.
ASSUME SUITABLE DRAFT
MATERIAL : ABS . CAVITY PR: 200kg/cm2
SHRINKAGE FACTOR : 0.5%
UNIFORM WALL THICKNESS=2mm

FIGURE 1
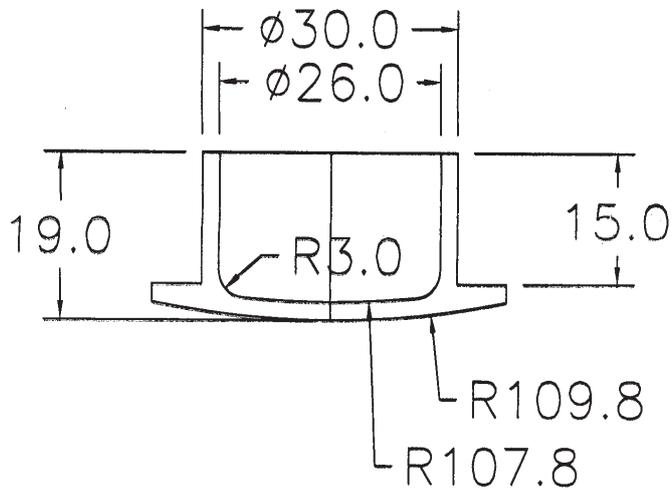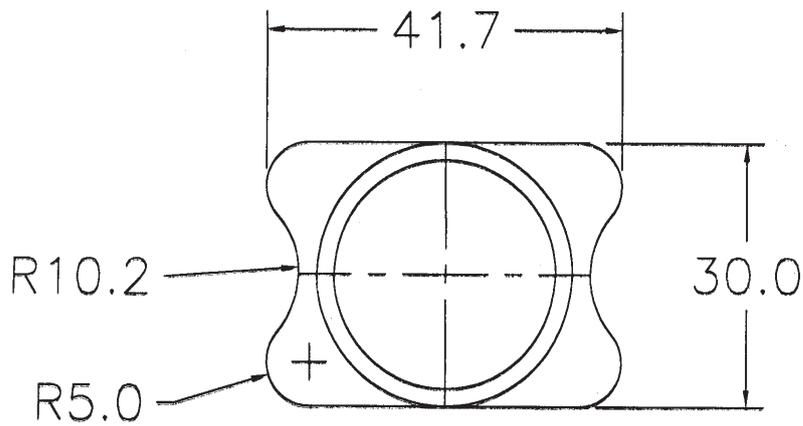
ALL DIMENSIONS ARE IN mm.
ASSUME SUITABLE DRAFT
MATERIAL : PP ; CAVITY PR: 180 kg/cm²
SHRINKAGE FACTOR : 1.8%
UNIFORM WALL THICKNESS=2mm

FIGURE 2

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[4064] - 64

B.E. (Production Engineering)
ADVANCED MATERIAL PROCESSING
(2003 Course) (Elective - II) (Sem. - II) (411090)

Time : 3 Hours]　　　　　　　　　　　　　　　　　　　　*[Max. Marks :100*

Instructions to the candidates:

1) *Answer three questions from section I and section II.*

2) *Answers to the sections should be written in separate books.*

3) *Neat diagrams must be drawn wherever necessary.*

SECTION - I
Unit - I

Q1) a) Explain with neat sketch dynamic turning process and compare it with conventional turning process. **[8]**

b) Explain stock removal grinding process. State its advantages. **[8]**

OR

Q2) a) Explain the chip formation mechanism in High speed machining. State advantages of High speed machining. **[8]**

b) Explain the development of tool geometry in drill tool. **[8]**

Unit - II

Q3) a) State the requirement of electrolyte used in ECM? Explain errors in ECM. **[8]**

b) Explain with neat sketch ECDG process. **[8]**

OR

Q4) a) For a Rc Ckt adjusted for maximum power supply, following details available, Resistance R=400 Ohm, Capacitance C=60 microfarad, Supply voltage=90 V. Calculate charging current, at the Instant when the CKT is switch on, frequency of discharge. **[8]**

b) Explain with graph the influence of Frequency, amplitude, Hardness ratio to work piece, feed ration on MRR in case of Rotary ultrasonic machining. **[8]**

Unit - III

Q5) a) What are the different roll dies used in rolled forging? Explain them also state factors on which die life depend. **[9]**

b) Explain with diagram a precision forging process and write its advantages.**[9]**

OR

Q6) a) Draw typical cross section rolled by ruing rolling. Compare single pass rolling and two pass rolling mill. **[9]**

b) What is meant by out of roundness turn in Three roll forming? Explain the factors responsible for it. **[9]**

SECTION - II
Unit - IV

Q7) a) Explain with neat sketch noflask casting process. **[8]**

b) Explain with neat sketch an injection casting g process. **[8]**

OR

Q8) a) Explain suitable process for casting of Al and Al alloys. **[8]**

b) State and explain controlling parameters in direct chill process? **[8]**

Unit - V

Q9) a) Explain with neat sketch Rotational molding for plastic component. **[8]**

b) Explain different methods for plastic joining. **[8]**

OR

Q10) a) Explain with neat sketch slip casting process of ceramic parts. **[8]**

b) Suggest and explain a suitable process for following i) tennis racket, ii) mug. **[8]**

Unit - VI

Q11) a) Explain CVD process. Compare it with PVD process. **[9]**

b) Explain defects in paint coating. **[9]**

OR

Q12) Write notes on following : **[18]**

a) MEMS, b) Photo electric polishing, c) Nano surface machining.

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<div align="center">

[4064] - 65

B.E. (Production Engineering)

ADVANCED PRODUCTION TECHNOLOGY

(2003 Course) (Elective - II) (Sem. - II) (411090)

</div>

Time : 3 Hours]   *[Max. Marks :100*

Instructions to the candidates:

1)   Answer three questions from section I and section II.

2)   Answer to the two sections should be written in separate books.

3)   Neat diagrams must be drawn wherever necessary.

<div align="center">

SECTION - I

Unit - I

</div>

Q1) a)   Explain the various KANBAN rules with their subrules.   **[8]**

b)   Explain the history behind the Toyota Production system.   **[8]**

<div align="center">OR</div>

Q2) a)   Explain how to shorten the lead times in TPS.   **[8]**

b)   Explain different ways to carry out automation in TPS.   **[8]**

<div align="center">

Unit - II

</div>

Q3) a)   Brief in detail the definition of benchmarking and explain the process.**[8]**

b)   What is Business Process reengineering?Explain steps in BPR.   **[9]**

<div align="center">OR</div>

Q4) a)   Explain with neat sketch various activities involved in SMED.   **[9]**

b)   Explain with suitable example the use of value stream mapping in industry.
                                                                         [8]

<div align="center">

Unit - III

</div>

Q5) a)   What do you mean by productivity term?How is it differ from performance.   **[8]**

b)   Explain 'Basic work content and Added work content in productivity.**[9]**

<div align="center">OR</div>

Q6) a) Describe the various hard and soft factors of the organisation for productivity improvement **[9]**

   b) Explain the various ways of measuring productivity **[8]**

SECTION - II
Unit - IV

Q7) a) Explain in detail the simulation study and different steps in that. **[9]**

   b) Explain Inferance engine. **[8]**

OR

Q8) a) What is Artificial Intelligence? Explain rules in it. **[8]**

   b) What are different trends and applications in simulation? **[9]**

Unit - V

Q9) a) What are the basic concept of a system and applications in engineering design? **[8]**

   b) What meant by the design synthesis and functional analysis in design.**[8]**

OR

Q10) a) Explain with suitable example use of geometric and topological information in design. **[8]**

   b) Explain the importance of tolerance analysis with respective to customer preference for product design. **[8]**

Unit - VI

Q11) a) Explain in detail the evolution of technology management. **[9]**

   b) What are the characteristics of technology management. **[8]**

OR

Q12) a) Discuss the levels of development of technology. **[9]**

   b) What is meant by technology management? State its importance of it in industry. **[8]**

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[4064] - 94

B.E. (Electrical)

HIGH VOLTAGE ENGINEERING

(2003 Course) (Elective - II) (Sem. - II) (403150)

Time : 3 Hours]   *[Max. Marks :100*

Instructions to the candidates:

1) *Answer any one question from each unit.*
2) *Answer three questions from section I and three questions from section II.*
3) *Answers to the two sections should be written in separate books.*
4) *Neat diagrams must be drawn wherever necessary.*
5) *Figures to the right indicate full marks.*
6) *Use of logarithmic tables, slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.*
7) *Assume suitable data, if necessary.*

SECTION - I

Unit - I

Q1) a)   Derive Townsend's current growth equation in the presence of primary and secondary ionization processes in gaseous material. From the current growth equation state the breakdown criterion in gaseous insulating material.   **[9]**

b)   What is time lag for breakdown in gases. State and explain the components of time lag. State the factors affecting the time lag.   **[7]**

OR

Q2) a)   State the drawbacks of Townsend's Theory. To overcome these limitations explain the streamet theory proposed by scientists. State streamet breakdown criterion. State the expression for the field due to space charge.   **[9]**

b)   Explain the meaning of corona discharge. State its bad effects and uses.**[7]**

Unit - II

Q3) a)   State the oxternal factors which affect the breakdown in solid dielectrics under normal industrial conditions. Explain the breakdown in solid dielectrics due to tracking. State the precautions to be taken to avoid tracking.   **[9]**

b)   What is intrinsic breakdown strength of solid dielectrics. Explain the intrinsic breakdown theory.   **[7]**

OR

P.T.O.

Q4) a) Explain the two breakdown theories accepted for commercial liquids. **[12]**

b) Explain the terms pure liquids and commercial liquids. **[4]**

Unit - III

Q5) a) State and explain the causes of over voltages due to switching surges and system faults. **[10]**

b) Write note on shielding of overhead line by ground wire. State the precautions to be taken while providing ground wire protection. **[8]**

OR

Q6) a) What is lightning stroke? Explain the direct and indirect lightning stroke. **[8]**

b) State the desired characteristics of lightning arrester. Write note on Zn O gapless type lightning arrester. **[6]**

c) Explain the terms residual voltage and spark over voltage in connection with lightning arrester. **[4]**

SECTION - II
Unit - IV

Q7) a) With neat diagram explain series resonance test system. How is resonance condition achieved? State the advantages and drawbacks of this method of generation of high ac voltage. **[8]**

b) A cock roft type voltage multiplier has 8 stages with capacitances all equal to 0.05 microfarad. The secondary voltage of supply transformer is 125 kV peak at frequency 150 Hz. If the load current to be supplied is 5 milliampere calculate i) ripple ii) voltage drop iii) regulation iv) optimum number of stages. **[8]**

OR

Q8) a) Draw cascading circuit for generation of high dc voltage. State the voltages to which capacitors are charged. Explain the basic voltage doubler circuit of this cascading unit. State the reason for calling one column of unit as oscillating and other one as smoothing column. What is effect of increase in supply frequency? Explain the meaning of optimum number of stages. **[10]**

b) An impulse generator has 8 stages with each condenser rated 0.16 microfarad at 125 kV. The load capacitor available is 1000 picofarad. Find series resistance and damping resistance needed to produce 1.25/50 microseconds impulse wave. State magnitude of wave front time and wavetail time of impulse wave. **[6]**

Unit - V

Q9) a) State different types of shunts for measurement of ac current of high frequency. Explain the advantage of using 4 terminal shunt instead of z terminal shunt. With neat diagram explain bifilar flat strip shunt. Label various parts in the diagram. Explain how stray inductance is reduced.**[10]**

b) With neat diagram explain chubb fortescue method of measurement of peak of voltage. State and explain the sources of error in measurement.**[6]**

OR

Q10) a) With neat diagram explain CVT. Explain its advantages also. **[8]**

b) State the hall effect. With neat diagram explain its use for measurement of high current. **[8]**

Unit - VI

Q11) a) Write note on testing of isolators and circuit breakers. **[10]**

b) With neat diagram explain the method of measurement of partial discharge. What is partial discharge? What is its unit for measurement. **[8]**

OR

Q12) a) Explain the operation of high voltage Schering Bridge for measurement of dissipation factor and capacitance of insulators and bushings. State the features of high voltage Schering bridge. State method of protecting low voltage arms from high voltage arms. **[12]**

b) Write note on testing of cables. **[6]**

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[4064] - 109

B.E. (Electronics)

SOFTWARE ENGINEERING

(Sem. - I) (2003 Course) (404205) (Elective - I)

Time : 3 Hours]   *[Max. Marks :100*

Instructions to the candidates:

   1)   *Solve Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6 from Section I and solve Q.7 or Q.8, Q.9 or Q.10, Q.11 or Q.12. from Section II.*
   2)   *Answers to the two sections should be written in separate books.*
   3)   *Figures to the right indicate full marks.*
   4)   *Neat diagrams must be drawn wherever necessary.*
   5)   *Assume suitable data, if necessary.*

SECTION - I

Q1) a) What is Software Process? Explain in detail Software Process Framework. **[10]**

   b) Explain the difference between Specific Goals and Specification Practices with example. **[6]**

OR

Q2) a) What is Process Pattern? Explain the template for process pattern proposed by Ambler. **[8]**

   b) Explain Prototyping Model with its advantages and disadvantages. **[8]**

Q3) a) Explain the Core Principles of Communication Practice. **[9]**

   b) What are the objectives of Software Testing? Explain different Testing Principles. **[8]**

OR

Q4) a) Explain the importance of Planning Practices? What questions must be asked and answered to develop a realistic project plan? **[9]**

   b) What is the goal of Business Process Engineering? Explain different architectures that are defined and developed as part of BPE. **[8]**

Q5) a) What are the basic guidelines for conducting a collaborative requirements gathering meeting? **[8]**

   b) What is DFD? Draw Level 0, Level l, Level 2 DFD for Railway Reservation System. **[9]**

OR

Q6) a) Explain the approach of Class-Based Modeling with proper example.**[8]**

b) Draw Usecase diagram for Credit Card Validation System. **[9]**

SECTION - II

Q7) a) Explain different design concepts. **[8]**

b) How do systems interoperate with one another? Explain with suitable example. **[8]**

OR

Q8) a) What are the characteristics of good design? **[8]**

b) Explain in detail the Golden Rules used while designing User Interface.**[8]**

Q9) a) What factors should be considered when the structure of a software team is chosen? **[7]**

b) What guidelines should be applied when we collect software metrics?**[7]**

c) Compare process metrics and project metrics. **[3]**

OR

Q10) a) How do we define key project characteristics? **[7]**

b) Explain different types of software measurement. Compare Size-Oriented and Function-Oriented Metrics by giving suitable example. **[10]**

Q11) a) Explain different types of resources that should be estimated during planning task. **[7]**

b) What is software configuration? What are the elements of configuration management system? **[5]**

c) Explain BPR Model in detail. **[5]**

OR

Q12) a) How do we size the software that we are planning to build? **[8]**

b) What is SCM process? What questions should the SCM process be designed to answer? **[9]**

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B.E. (IT)

MOBILE COMPUTING

(Sem. - I) (2003 Course) (414445) (Elective - I)

Time : 3 Hours]   *[Max. Marks :100*

Instructions to the candidates:

1)   Answers to the two sections should be written in separate answer books.

2)   Neat diagrams must be drawn wherever necessary.

3)   Assume suitable data, if necessary.

SECTION - I

Q1) a) Explain various types of mobilities you know.   **[8]**

b) Explain the concept of Core, Edge and Access network in mobile communication system.   **[8]**

OR

Q2) a) Explain various generation of mobile communication system.   **[8]**

b) Explain in detail the concept of frequency reuse.   **[8]**

Q3) Explain GSM architecture in detail with appropriate diagram. Also explain all the algorithms used in GSM security.   **[18]**

OR

Q4) Write short notes on :   **[18]**

a) Bluetooth

b) Java card

c) IPv6

Q5) a) Explain WAP protocol stack in detail.   **[8]**

b) Explain how GSM system can be upgraded to GPRS.   **[8]**

OR

Q6) a) Explain the transmission plane characteristics of GPRS.   **[8]**

b) Explain FHSS and DSSS.   **[8]**

SECTION - II

Q7) a) What are the advantages and disadvantages of WLAN? Under what situation is WLAN desirable over LAN? **[8]**

b) Explain the design issues for applications targeted for handheld devices.**[8]**

OR

Q8) a) Explain in general WLAN architecture. **[8]**

b) Explain the internal components of PDA. **[8]**

Q9) a) Explain Palm OS architecture. **[8]**

b) Explain the various layers in Symbian OS. **[8]**

OR

Q10) a) Explain the 3 prong approach used in Java. **[8]**

b) Explain various security issues used in Symbian OS. **[8]**

Q11) a) Compare SIP and H.323. **[9]**

b) Explain various attacks on static and dynamic assets. **[9]**

OR

Q12) Write short notes on : **[18]**

a) Real time Protocols.

b) Flavors of Windows CE.

c) Components of Information security.

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[4064] - 291

B.E. (Biotechnology)
PLANT ENGINEERING
(Sem. - II) (2003 Course)

Time : 3 Hours]   *[Max. Marks :100*
Instructions to the candidates:
   1)   *Answer any three questions from each section.*
   2)   *Answers to the two sections should be written in separate books.*
   3)   *Draw a neat sketch wherever necessary.*
   4)   *Figures to the right indicate full marks.*
   5)   *Make necessary assumptions wherever necessary.*

SECTION - I

Q1) a) Justify, 'Pilot plant data' is required even if Laboratory data is available.**[8]**

    b) Draw a neat piping and Instrumentation diagram of distillation column indicating condenser and reboiler. **[10]**

OR

Q2) a) What are the main factors in making Techno-economic feasibility study? Explain in detail. **[9]**

    b) Discuss the process design aspects. **[9]**

Q3) a) Discuss various types of project design for any pharmaceutical industry. **[8]**

    b) Explain in details the factors affecting process selection. **[8]**

OR

Q4) a) Discuss the capacity estimation and economic factors for various utilities. **[8]**

    b) Explain the scale up of reactor, using basic scale up principles. **[8]**

Q5) Draw utility line diagram for : **[16]**

    a) Batch reactor

    b) Tray dryer

OR

Q6) What are the various types of utilities used in pharmaceutical industry? Explain each. **[16]**

P.T.O.

SECTION - II

Q7) a) Explain various types of supports used for piping in chemical plants.**[9]**

b) Discuss color codes used for transportation of fluids in plants.   **[9]**

OR

Q8) a) Write a short note on: **[9]**
    i)   Pipe sizing
    ii)   Pipe fittings

b) Discuss steps involved in piping layout.   **[9]**

Q9) a) Explain the principles and significance of following transportation equipments :   **[8]**
    i)   Vacuum system
    ii)   Blower system

b) Explain plant safety operation and maintenance.   **[8]**

OR

Q10) a) Explain working of steam jet ejector.   **[8]**

b) Describe characteristic curves of centrifugal pump.   **[8]**

Q11) a) Differentiate between CPM and PERT techniques in detail.   **[8]**

b) Explain HAZOP study. How HAZOP study is useful for controlling the process parameters.   **[8]**

OR

Q12) Write short note on :   **[16]**
    a) Indian Boiler Regulations(IBR)
    b) Energy Law

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[4064] - 443

B.E. (Production Engg.)
MATERIALS AND LOGISTICS MANAGEMENT
(Sem. - I) (2008 Course) (411085 (B)) (Elective - II)

Time : 3 Hours]   *[Max. Marks :100*

Instructions to the candidates:

1) *Answer three questions from section I and three questions from section II.*
2) *Answers to the two sections should be written in separate answer books.*
3) *Neat diagrams must be drawn wherever necessary.*
4) *Figures to the right indicate full marks.*

SECTION - I
Unit - I

Q1) a) Explain functions of materials management.   **[9]**

b) Explain factors influencing make or Buy decisions.   **[9]**

OR

Q2) a) Complete the materials requirement plan for an item 'Z' shown below the item has an independent demand and a safety stock of 50 is maintained.   **[9]**

order Quantity = 70												
Lead time 4 weeks	1	2	3	4	5	6	7	8	9	10	11	12
Safety stock = 50												
Projected Requirements	20	20	25	20	20	25	20	20	30	25	25	25
Receipts		70										
On hand at the end of period (7S)												
Planned order release												

b) What is functional analysis? Explain with respect to V.E.   **[9]**

Unit - II

Q3) a) Explain Purchase Cycle with flowchart.   **[8]**

b) What are the factors to evaluate potential supplier.   **[8]**

OR

Q4) a) What is vendor rating? Explain methods of vendor rating in brief. **[8]**

b) Explain import cycle.   **[8]**

Q5) a) Explain and differentiate between.   **[8]**
   i)   Centralised and decentralised stores.
   ii) Annual stock taking and continuous stock taking.

   b) Explain waste disposal system.   **[8]**

<div align="center">OR</div>

Q6) a) Explain functions of stores department. What are the different factors to be considered for optimum stores layout.   **[8]**

   b) Explain various causes of surplus and obsolete stock.   **[8]**

<div align="center">

SECTION - II
Unit - IV

</div>

Q7) a) Explain various modes of transportation. On what basis one should decide the best mode of transport.   **[8]**

   b) Explain different types of warehouse.   **[8]**

<div align="center">OR</div>

Q8) a) Explain transport management strategy.   **[8]**

   b) Explain different activities components of a logistic system.   **[8]**

<div align="center">**Unit - V**</div>

Q9) a) Explain different risk in supply chain.   **[8]**

   b) Define supply chain. State importance of SCM in industries.   **[8]**

<div align="center">OR</div>

Q10) a) What are the supply chain drivers? Briefly discuss the forces of changing in SCM.   **[8]**

   b) Explain internal performance measures for SCM.   **[8]**

<div align="center">**Unit - VI**</div>

Q11) a) Explain following costs related to inventory.   **[9]**
   i)   Inventory carrying cost
   ii) Procurement cost
   iii) Setup cost
   iv) Stockout cost

   b) The requirement of a perticular size of sleeve at an automobile firm is estimated at 7500 numbers per year. Unit price is Rs 25. The inventory carrying cost is 0.20 of unit price; procurement cost/order is Rs 80. Find EOQ and Annual inventory cost.   **[9]**

*Q12)*a) Define following terms related to inventory and also show diagramatically. **[9]**

  i)   Lead time

  ii) Reorder level

  iii) Safety stock

  iv) Average inventory level.

  b) A firm uses every year 12,000 units of raw material costing Rs. 1.25 / unit, ordering cost is Rs 15 / order and holding cost is 5% per year of average inventory. Find

  i)   E.O.Q.

  ii) The firm follows EOQ purchasing policy it operates for 300 days / year. Procurement time is 14 days and safety stock is 400 units. Find reorder point; maximum inventory, Average inventory.**[9]**

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[4064]-454

B.E. (Production Engineering) (Sandwich)
MATERIALS MANUFACTURING AND LOGISTICS
(Sem. - I) (2008 Course) (411125 (B)) (Elective - II)

Time : 3 Hours]   *[Max. Marks :100*

Instructions to the candidates:
1) *Answer three questions from section I and section II.*
2) *Answers to the sections should be written in separate answer books.*
3) *Neat diagrams must be drawn wherever necessary.*

SECTION - I
Unit - I

Q1) a)   Explain the scope of materials management.   **[9]**

   b)   Illustrate with an example how B.E.A. can be used in choice of m\cs or processes amongst alternatives.   **[9]**

OR

Q2) a)   Explain various phases of 'value analysis' in detail.   **[9]**

   b)   Write short note on :
         i)   B.O.M   ii)   M.P.S.   **[9]**

Unit - II

Q3) a)   Explain relation of purchase department with production & sales department.   **[8]**

   b)   Explain 'Purchase Cycle'.   **[8]**

OR

Q4) a)   Define 'vendor Rating'. Explain weighted point method of vendor rating with example.   **[8]**

   b)   Explain 'Import substitutions'.   **[8]**

Unit - III

Q5) a)   Describe FIFO method with its advantages & limitations.   **[8]**

   b)   Explain waste disposal system.   **[8]**

OR

Q6) Write short note on :   **[16]**
   a)   Stock recording process
   b)   Bin card
   c)   Inward and outward register.

SECTION - II

Unit - IV

Q7) a) Illustrate a common trade-off that occurs between the work areas of logistics. **[8]**

b) Describe the five modes of transportation, identify the most significant characteristics of each. **[8]**

OR

Q8) a) Discuss and illustrate the role of warehouses in reverse logistics. **[8]**

b) What are the functional areas of logistics. **[8]**

Unit - V

Q9) a) What is EOQ? Derive an expression for the economic order quantity when the stock replanishment is instantaneous giving the assumptions mode. **[8]**

b) i) Explain VED analysis in detail.

ii) Explain H.M.L. analysis in detail. **[8]**

OR

Q10) a) Explain the various costs associated with inventory decisions. **[8]**

b) Explain A B C analysis in detail. **[8]**

Unit - VI

Q11) a) Derive the formula for E.M.Q. When the replanishment is non-instantaneous (Gradual) state the assumptions mode. **[9]**

b) One item is manufactured at the rate of 4800 units per week and is consumed at the rate of 3000 per week. If the setup cost of manufacturing is Rs 450 per setup and cost-of holding the stock is Rs 0.4 per unit per week find.

i) Economic batch Quantity to be produced and max inventory.

ii) Manufacturing period

iii) Cycle time of operation. **[9]**

OR

Q12) a) Differentiate between fixed order system and fixed period system. **[9]**

b) A company has a demand of 12,000 units per year and it can produce 2000 units per month setup cost is Rs 400 and holding charges are Rs 0.15 per unit per month. **[9]**

i) Find the optimal lot size and total cost of operating inventory per year.

ii) Find maximum inventory and manufacturing cycle time.

iii) If the cost of shortage is Rs 20 per unit per annum. Find ordering quantity, manufacturing and total time.

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[4064]-470

B.E. (Electrical Engg.)
SMART GRID
(Sem. - I) (2008 Course) (403144 (D)) (Elective - II)

Time : 3 Hours]   *[Max. Marks :100*

Instructions to the candidates:

 1) *Answers to the two sections should be written in separate answer books.*
 2) *Solve Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6 from Section I and solve Q.7 or Q.8, Q.9 or Q.10, Q.11 or Q.12. from Section II.*
 3) *Figures to the right indicate full marks.*
 4) *Neat diagrams must be drawn wherever necessary.*
 5) *Assume suitable additional data, if necessary.*

SECTION - I

Q1) a) Define and explain the Smart Grid concept and also give its need. **[10]**

   b) Give CDM opportunities in Smart Grid.   **[8]**

                                OR

Q2) a) Give functions of Smart Grid also state its opportunities and Barriers.**[10]**

   b) Write the list of difference between conventional grid and Smart Grid.**[8]**

Q3) a) Give functions and benefits of smart meter.   **[8]**

   b) How Smart Grid can be benefited by implementing PHEV technology and also give different modes of operation of PHEV.   **[8]**

                                OR

Q4) a) How outages can be managed by implementing OMS.   **[8]**

   b) Why Real Time prizing should be implemented and give its development stages.   **[8]**

Q5) a) Explain the role of smart substations in Smart Grid, and also give its function.   **[8]**

   b) Explain WAMS and gives its advantages.   **[8]**

                                OR

Q6) a) Give functions of IED's and their application for monitoring and protection.   **[8]**

   b) Explain PMU and its importance in Smart Grid.   **[8]**

SECTION - II

Q7) a) Explain concept of Microgrid, and state its issues related to inter connection. **[10]**

b) Explain fuel cells, and also its need and applications. **[8]**

OR

Q8) a) Explain about formation of Microgrid and also its need. **[10]**

b) Explain captive power plant and also its need. **[8]**

Q9) a) Explain power Quality importance in Smart Grid and how can it be improved. **[8]**

b) Explain role of Power Quality Audit in Smart Grid. **[8]**

OR

Q10) a) Explain Power Quality issues of Grid connected Renewable Energy Sources. **[8]**

b) Explain web based Power Quality monitoring. **[8]**

Q11) a) Explain role of AMI in Smart Grid. **[8]**

b) Explain concept of Wireless Mesh Network in Smart Grid. **[8]**

OR

Q12) a) Explain role of HAN in Smart Grid. **[8]**

b) Why cyber security is of prime importance in Smart Grid and how it can be achieved. **[8]**

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P1048

[4064] - 477

B.E. (Electronics)

EMBEDDED SYSTEM

(2008 Course) (404203) (Sem. - I)

Time : 3 Hours]   *[Max. Marks :100*

Instructions to the candidates:

1) *Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6 from Section I and Q.7 or Q. 8, Q.9 or Q.10, Q.11 or Q.12. from Section II.*

2) *Answers to the two sections should be written in separate books.*

3) *Neat diagrams must be drawn wherever necessary.*

4) *Figures to the right indicate full marks.*

SECTION - I

Q1) a) With the help of revenue generation model explain effect of entry time on profit performance.   **[10]**

b) Compare Bluetooth and Zigbee protocols on the basis of performance parameters, issues in implementation and suitability for applications. **[8]**

OR

Q2) a) What is IDE? Explain role and importance of tool-chain in embedded system software development.   **[10]**

b) What are the criteria to decide among general purpose processors or embedded systems for specific application. What are the recent trends in embedded system design?   **[8]**

Q3) a) Discuss processor selection with the help of specific application of embedded systems. List the governing factors for selection.   **[8]**

b) What are architectural features and specifications of processor to be used in embedded systems?   **[8]**

OR

Q4) a) Explain memory organization in embedded systems and memory interfacing techniques for embedded processors.   **[8]**

b) Explain role of context switching in interrupt service routine. How priority of interrupts can be changed?   **[8]**

Q5) a) Explain Data Flow Model for LPC 2148 with suitable diagram. **[8]**

b) Differentiate ARM Mode and THUMB Mode operations of ARM 7 processor. **[8]**

OR

Q6) a) List different registers used in ARM 7 processor with functions of them. What is register banking? **[8]**

b) Write short note on ISP and IAP. **[8]**

SECTION - II

Q7) a) What is hard and soft real time system? Discuss issues in design real time systems. **[8]**

b) Discuss how embedded C is used for LPC 2148 programming, What are the advantages compared? **[8]**

OR

Q8) a) Explain 4*4 Matrix keyboard and 20*2 LCD interface with suitable interfacing diagram and control. Draw Flowchart for LCD Initialisation.**[8]**

b) How on-chip multi- channel ADCs and DACs are configured, explain with the help of registers and select logic. **[8]**

Q9) a) What is Deadly embrace condition? How this situation can be avoided?**[6]**

b) List different scheduling algorithms used in general? Explain scheduling used in uCOS II . **[10]**

OR

Q10) a) What are the basic differences in General Purpose OS and RTOS for Task and Memory Management and Service handling, Communication and priority mechanisms? **[10]**

b) What are the features of uCOS II? List any four services offered by uCOS II. **[6]**

Q11) With respect to block diagram, processor, memory, inter processor communication, algorithms and software architecture explain design of digital camera. **[18]**

OR

Q12) a) With respect to block diagram, memory, processor explain smart card design. **[9]**

b) Explain Priority inheritance and Priority inversion problems. **[9]**

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P1049

[4064] - 493

B.E. (E&TC)

COMPUTER NETWORK

(Sem. - I) (2008 Course) (404183)

Time : 3 Hours]   *[Max. Marks :100*

Instructions to the candidates:

  1)   *Answer three questions from Section I and three questions from Section II.*

  2)   *Answer to the two sections should be written in separate answer books.*

  3)   *Neat diagrams must be drawn wherever necessary.*

  4)   *Figures to the right indicate full marks.*

  5)   *Use of electronic pocket calculator is allowed.*

  6)   *Assume suitable data, if necessary.*

SECTION - I

Q1) a)   Multiple Choice questions. Select one Correct answer for each of the following i) to vi) and write it.   **[6]**

  i)   The _____ is the physical path over which a message travels.

   A)   Protocol,   B)   Medium,

   C)   Signal,   D)   All the three.

  ii)   The OSI model consists of _____ layers.

   A)   Three,   B)   Five,

   C)   Seven,   D)   Eight.

  iii) _____ are used for short-range communications such as those between a PC and a peripheral device.

   A)   Radio waves,   B)   Microwaves,

   C)   Infrared waves,   D)   none of these

  iv)   In a fiber-optic cable, the signal is propagated along the inner core by

   A)   reflection,   B)   refraction,

   C)   modulation,   D)   none of these.

  v)   In _____ there are no setup or teardown phases.

   A)   datagram switching,   B)   circuit switching,

   C)   frame switching,   D)   none of these.

vi) _____ technology is a set of technologies developed by the telephone companies to provide high data rate transmission.

A) ASL,   B) DSL,

C) LDS,   D) none of these

b) i) What is dial-up modem technology? List some of the common modem standards discussed in this chapter and give their data rates. **[5]**

ii) What type of topology is used when customers in an area use DSL modems for data transfer purposes? Explain. **[5]**

OR

Q2) a) Multiple Choice questions. Select one Correct answer for each of the following i) to vi) and write it. **[6]**

i) Data from a computer are _____; the local loop handles _____ signals

A) analog; analog   B) analog; digital,

C) digital; digital   D) digital; analog

ii) A local telephone network is an example of a _____ network.

A) packet-switched,   B) circuit-switched,

C) message-switched,   D) none of these

iii) Traditionally, _____ methods of switching have been important.

A) four,   B) three,

C) five,   D) six

iv) Circuit switching takes place at the _____ layer.

A) data line,   B) physical,

C) network,   D) transport

v) Which of the following is not a guided medium?

A) twisted-pair cable,   B) coaxial cable,

C) fiber-optic cable,   D) atmosphere.

vi) The physical layer is concerned with the movement of _____ over the physical medium.

A) Programs,   B) dialogs,

C) protocols,   D) bits.

b) Five equal-size datagrams belonging to the same message leave for the destination one after another. However, they travel through different paths as shown in Table 2b.l.

Table 2b.1

Datagram	Path Length	Visited Switches
1	3200 Km	1,3,5
2	11,700 Km	1, 2, 5
3	12,200 Km	1, 2, 3, 5
4	10,200 Km	1,4,5
5	10,700 Km	1,4,3,5

Assume that the delay for each switch (including waiting and processing) is 3, 10, 20, 7, and 20 ms respectively. Assuming that the propagation speed is 2×10^8 m, find the order the datagrams arrive at the destination and the delay for each. Ignore any other delays in transmission. **[10]**

Q3) a) Fill in the gaps by selecting one correct answer from the given set. **[8]**

i) In Go-Back-N ARQ, if frames 4,5, and 6 are received successfully, the receiver may send an ACK _____ to the sender.

ii) In _____ framing, there is no need for defining the boundaries of frames.

iii) In pure ALOHA, the vulnerable time is _____ the frame transmission time.

iv) The _____ layer of Ethernet consists of the LLC sublayer and the MAC sublayer.

Given set of answers.: A] 6, B] variable size, C] three times, D] 7, E] the same as, F] fixed size, G] two times, H] 8, I] data link, J] standard, K] physical, L] network

b) The timer of a system using the Stop-and-Wait ARQ Protocol has a time-out of 6 ms. Draw the flow diagram for four frames if the round trip delay is 4 ms. Assume no data frame or control frame is lost or damaged. **[5]**

c) Suppose the length of a 10Base5 cable is 2500 m. If the speed of propagation in a thick coaxial cable is 200,000,000 m/s, how long does it take for a bit to travel from the beginning to the end of the network? Assume there are 10 microsec delay in the equipment. **[5]**

OR

Q4) a) Fill in the gaps by selecting one correct answer from the given set. **[8]**

   i) For Stop-and-Wait ARQ, for *10* data packets sent, _____ acknowledgments are needed.

   ii) In a _____ protocol, the data section of a frame is a sequence of characters.

   iii) In ____ each station sends a frame whenever it has a frame to send.

   iv) The _____ sublayer is responsible for the operation of the CSMA/CD access method and framing.

   Given set of answers.
   A] character oriented, B] exactly 10, C] bit oriented, D] pure ALOHA, E] LLC, F] less than10, G] slotted ALOHA, H] both pure and slotted ALOHA, I] MAC, J] greater than 10, K] word oriented, L] MII.

   b) A system uses the Stop-and-Wait ARQ Protocol. If each packet carries 1000 bits of data, how long does it take to send 1 million bits of data if the distance between the sender and receiver is 5000 km and the propagation speed is 2×10^8 m? Ignore transmission, waiting, and processing delays. We assume no data or control frame is lost or damaged.(ignore the overhead due to the header and trailer). **[10]**

Q5) a) Fill in the gaps by selecting one correct answer from the given set. **[6]**

   i) IEEE has defined the specifications for a wireless LAN, called _____, which covers the physical and data link layers.

   ii) A repeater is a connecting device that operates in the _____ layer of the Internet model.

   iii) In ATM, the ____ layer accepts transmissions from upper-layer services and maps them into ATM cells.

   Given set of answers .
   A] physical, B] ATM, C] IEEE802.3, D] network, E] AAL, F] IEEE802.11, G] physical, H] IEEE802.5, I]]data link

   b) Create a system of three LANs with four bridges. The bridges (B 1 to B4) connect the LAN s as follows :
   i) B1 connects LAN 1 and LAN 2.
   ii) B2 connects LAN 1 and LAN 3.
   iii) B3 connects LAN 2 and LAN 3.
   iv) B4 connects LAN 1, LAN 2, and LAN 3.

   Choose Bl as the root bridge. Show the forwarding and blocking ports, after applying the spanning tree procedure, by drawing sketches for network, graph, spanning tree and blocking ports. **[10]**

OR

Q6) a) Fill in the gaps by selecting one correct answer from the given set. **[6]**

   i) In IEEE 802.11, communication between two stations in two different BSSs usually occurs via two _____.

   ii) A _____ regenerates a signal, connects segments of a LAN, and has no filtering capability.

   iii) Frame Relay networks offer an option called _____ that sends voice through the network.

   Given set of answers.
   A] router, B] APs, C] ESSs, D] repeater, E] VOFR, F] BSSs, G] bridge, H] MUX, I] FRAD

   b) lf an application uses AAL3/4 and there are 47,787 bytes of data coming into the CS, [In AAL3/4, the CS layer needs to pass 44-byte data units to SAR layer.Packet uses 4byte each for header and trailer.]
   How many padding bytes are necessary?
   How many data units get passed from the SAR to the ATM layer?
   How many cells are produced? **[10]**

SECTION - II

Q7) a) Multiple Choice questions. Select one Correct answer for each of the following i) to vi) and write it. **[6]**

   i) In IPv4, class _____ has the greatest number of addresses in each block

   A) 4,   B) 8,

   C) 32,   D) 64

   ii) The number of addresses in a class C block is _____ .

   A) 65,534,   B) 256,

   C) 16,777,216,   D) none of these

   iii) In IPv4, what is the value of the total length field in bytes if the header is 28 bytes and the data field is 400 bytes?

   A) 428,   B) 407,

   C) 107,   D) 427

iv) In IPv4, when a datagram is encapsulated in a frame, the total size of the datagram must be less than the _____ .

   A) MUT,   B) MAT,

   C) MTU,   D) none of these

v) In _____, a table associating a logical address with a physical address is updated manually.

   A) static mapping,   B) dynamic mapping,

   C) physical mapping,   D) none of these

vi) _____ deals with the issues of creating and maintaining routing tables.

   A) Forwarding ,   B) Routing ,

   C) Directing ,   D) none of these

b) An IPv4 datagram has arrived with the following information in the header (in HEX) **Ox45 00 00 54 00 03 58 50 20 06 00 00 7C 4E 03 02 B4 OE OF 02**

   i) Is the packet corrupted?

   ii) Are there any options?

   iii) Is the packet fragmented?

   iv) What is the size of the data?

   v) How many more routers can the packet travel to?   **[10]**

<div align="center">OR</div>

Q8) a) Multiple Choice questions. Select one Correct answer for each of the following i) to vi) and write it.   **[6]**

   i) Identify the class of the following IPv4 address: 191.1.2.3.

   A) C,   B) A,

   C) B,   D) none of these

   ii) An organization is granted a block; one address is 2.2.2.64/20. The organization needs 10 subnets. What is the subnet prefix length?

   A) /20,   B) /24,

   C) /25,   D) none of these

   iii) The _____ protocol is the transmission mechanism used by the TCP/IP suite.

   A) ARP,   B) IP,

   C) RARP,   D) none of these

iv) The IPv4 header size _____ .

A) is 20 to 60 bytes long,   B) is 20 bytes long,

C) is 60 bytes long,   D) none of these

v) The logical addresses in the Internet are called _____ addresses.

A) port,   B) IP,

C) Email,   D) none of these

vi) The use of hierarchy in routing tables can _____ the size of the routing tables.

A) reduce,   B) increase,

C) both A and B,   D) none of these

b) A router has the following RIP routing table:

Net1 4 B
Net2 2 C
Net3 1 F
Net4 5 G

What would be the contents of the table if the router received the following RIP message from router C?

Net1 2
Net2 1
Net3 3
Net4 7

Assume router C is one hop away.   **[10]**

Q9) a) Fill in the gaps by selecting one correct answer from the given set. **[6]**

i) One of the responsibilities of the transport layer protocol is to create a _____ communication.

ii) The ports ranging from 49,152 to 65,535 can be used as temporary or private port numbers. They are called the _____ ports.

iii) In _____ we try to avoid traffic congestion.

Given set of answers :

A) process-to-process,   B) node-to-node,

C) none of these,   D) congestion control,

E) dynamic,   F) quality of service,

b) What is the definition of bursty data?
What is the difference between open-loop congestion control and closed-loop congestion control?
Name the policies that can prevent congestion. **[6]**

c) In a leaky bucket used to control liquid flow, how many gallons of liquid are left in the bucket if the output rate is 5 gal/min, there is an input burst of 100 gal/min for 12 s, and there is no input for 48 s? **[4]**

OR

*Q10)*a) Fill in the gaps by selecting one correct answer from the given set.

   i) UDP is an acronym for _____ . **[2]**

   ii) The ports ranging from 49,152 to 65,535 can be used as temporary or private port numbers. They are called the _____ ports. **[2]**

   iii) Traffic _____ are qualitative values that represent a data flow. **[2]**

   Given set of answers :

   A) User Datagram Protocol, B) port addresses;

   C) controls,   D) User Delivery Protoco,

   E) transport addresses,   F) descriptors,   ,

b) Q23.20. The following is a dump of a UDP header in hexadecimal format.

   0632 000D 00IC E217

   i) What is the source port number?

   ii) What is the destination port number?

   iii) What is the total length of the user datagram?

   iv) What is the length of the data?

   v) Is the packet directed from a client to a server or vice versa? **[10]**

*Q11)*a) Determine which of the following is an FQDN and which is a PQDN.

   i) xxx
   ii) xxx.yyy.
   iii) xxx.yyy.net
   iv) zzz.yyy.xxx.edu. **[2]**

b) If a DNS domain name is *voyager fhda.edu,* how many labels are involved here? How many levels of hierarchy? **[2]**

c) Describe the addressing system used by SMTP. **[2]**

d) What are some advantages and disadvantages of using long passwords? **[2]**

e) Plain text was encrypted using RSA key(Kp = 33,3).English alphabets (A,B.. up-to Z) are numbered as (1,2.. up-to 26) respectively. The encrypted Ciphertext (C) transmitted as (11, 01, 14, 24, 03, 05, 01). The received signals are decrypted using key (Ks = 33,7) . Find out the symbols i.e. alphabets after decryption.
[Given algorithm to avoid exponentation operation....
$C := 1$; *begin for i = 1 to E do*
$C := MOD$ *(C. P, N);* end. Where E is exponent.] **[10]**

OR

*Q12)*a) Determine which of the following is an FQDN and which is a PQDN.

i) mil.

ii) edu.

iii) xxx.yyy.net

iv) zzz.yyy.xxx.edu **[2]**

b) A domain name is ***hello. customer. info.*** Is this a generic domain or a country domain? **[2]**

c) What is a certification authority? **[2]**

d) In electronic mail, what are the tasks ofa user agent? **[2]**

e) The encrypted message is "***NBCM CM UH YRYLWCMY.***" using a shift cipher with a key of 20. [The characters are encoded with A to Z as 0 to 25. To wrap, subtract 26.] Ignore the space between words. Decrypt the message to get the original plaintext. **[10]**

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P1050   **[4064] - 563**

B.E. (Petrochemical Engg.)
ENVIRONMENTAL ENGINEERING
(2008 Course) (Sem. - I) (412403)

Time : 3 Hours]   *[Max. Marks :100*

Instructions to the candidates:
1) *Answers any 3 questions from each section.*
2) *Answers to the two sections should be written in separate books.*
3) *Neat diagrams must be drawn wherever necessary.*
4) *Figures to the right indicate full marks.*
5) *Use of electronic pocket calculator is allowed.*
6) *Assume suitable data, if necessary.*

SECTION - I

Q1) a) Discuss in detailed about separation. handling and transportation of Biomedical waste.   **[5]**

   b) Describe aquatic eco system with neat diagram   **[6]**

   c) Discuss the mechanism of formation of ozone layer? What are the harmful effects of Ozone layer depletion?   **[5]**

OR

Q2) a) Discuss the role of Environmental Engineer for pollution control.   **[4]**

   b) What is Kyoto Protocol & CDM? How and when CDM can be applicable? How it can be helpful for developing countries?   **[7]**

   c) Enlist various types of hazardous waste.   **[5]**

Q3) a) With the help of flow diagram. explain 'Ethyl Amine Process' for removal of acidic pollutants from gaseous emissions from petroleum industries.**[6]**

   b) Write a note on factors on which choice of Air pollution Control equipment depends.   **[4]**

   c) Discuss the important laws and standard for control of air pollution.**[6]**

OR

Q4) a) Discuss at least three basic mechanisms with principle, working, advantages and disadvantages for removing particulate matter from gas streams. **[8]**

b) Discuss the sources and ill effects of any four gaseous pollutants in details. **[8]**

Q5) a) Write short note on Objectives of using air pollution Control Equipment. **[4]**

b) Discuss the Meteorology factors influencing air pollution. **[8]**

c) A conventional cyclone with diameter 2 m handles 6 m^3/s of standard air carrying particles with a density of 2000 kg/m^3. For effective number of turns (Ne) = 6. Determine the cut size. What will be the cut size for a high efficiency cyclone? Take viscosity of gas (μg) as 1.81×10^{-5} kg/(m.s.). Neglect the density of the gas. **[6]**

OR

Q6) Write a short note on following: (Any 4) : **[18]**

a) Source Correction method for air pollution.

b) Effect of gas flaring.

c) Control of NO_x in a complex fertilizer plant.

d) Solid waste disposal by incineration.

e) Green House effect.

f) Ventury Scrubber.

SECTION - II

Q7) a) Discuss various physical and chemical characteristics of wastewater. **[8]**

b) Write in short importance of BOD test. Give the limitations of BOD test. What is ultimate BOD? **[4]**

c) What is Chemical Oxygen demand? Can we determine tentative BOD of wastewater if its COD is known? How? **[4]**

OR

Q8) a) Write the detailed classification of solids found in waste water. **[6]**

b) Discuss general standards for quality of water for different purposes. **[6]**

c) Discuss the different water pollution laws and standards which protect water from pollution. **[4]**

Q9) a) Compare between the Trickling filter and Activated sludge systems (Minimum 5 points). **[4]**

b) Discuss various methods of recovery of materials from process effluents. **[6]**

c) Discuss principle, construction, working, advantages and disadvantages of trickling filter with neat sketch. **[6]**

OR

Q10) a) Differentiate between suspended culture growth process and attached culture growth process. Give one example, of each, of treatment method which works on above principle. **[8]**

b) Explain activated sludge process for waste water treatment and give design criteria for the design of its reactor. Draw the flow chart for conventional activated sludge process. **[8]**

Q11) a) Discuss the sources and method of treatment for Refinery liquid waste with neat sketch. **[9]**

b) Discuss the sources and treatment method for dairy industry waste water with neat sketch. **[9]**

OR

Q12) Write a short note on (Any four) : **[18]**

a) Role of MPCB & CPCB.

b) OSHA.

c) ISO 14000.

d) Importance of regulations for hazardous waste.

e) Paper & pulp mill waste treatment.

f) Sanitary land filling operations

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P1051

[4064] - 606

B.E. (IT)

COMPILER DESIGN

(Sem. - I) (2008 Course) (Elective - I) (414443 (C))

Time : 3 Hours] *[Max. Marks :100*

Instructions to the candidates:

1) *Answer three questions from each section.*
2) *Answers to the two sections should be written in separate answer books.*
3) *Neat diagrams must be drawn wherever necessary.*
4) *Figures to the right indicate full marks.*
5) *Assume suitable data, if necessary.*

SECTION - I

Q1) a) Why is it necessary to group the phases of the compiler? How will you group the phases of compiler? **[6]**

b) Explain in detail the process of compilation. Explain the output of each phase for the following statement **[10]**
$T1 = T2 * T3 + 2*6.3 + 2*T2$

OR

Q2) a) List the errors encountered in each phase of compilation. **[4]**

b) Explain in detail the various phases of a compiler, describe the output for the following expression after each phase. Considering and without considering the precedence and associativity of operators. **[12]**
$a = b*c + c*b$

Q3) a) Define the term **[6]**
Lexeme, Tokens and Patterns with example

b) Write regular definitions for the following languages **[10]**

i) all string of letters that contain the five vowels in order.

ii) All strings of letters in which the letters are in ascending lexicographic order.

iii) Comments consisting of a string surrounded by /* and */ without an intervening */ unless it appears inside the quotes "and".

iv) All string of digits with no repeated digits.

OR

Q4) a) In a string of length n. how many of the following are there? **[6]**

     i) Prefixes

     ii) Suffixes

     iii) Substrings

     iv) Proper prefixes

     v) subsequences

  b) Specify the lexical form (regular definition and DFA) of numerical constants, identifiers and keywords in the 'C' programming language.**[10]**

Q5) a) Every SLR(1) grammar is unambiguous. **[10]**

But for the following unambiguous grammar prove that it is not SLR(1)

$S \rightarrow L=R$

$S \rightarrow R$

$L \rightarrow *R$

$L \rightarrow id$

$R \rightarrow L$

  b) Consider the grammar **[8]**

$S \rightarrow (L) / a$

$L \rightarrow L, S / S$

     i) what are the terminal, nonterminal and start symbol

     ii) find the parse trees for (a,a) and (a,(a,a))

     iii) construct leftmost derivation for (a,a) and (a,(a,a))

     iv) construct rightmost derivation for (a,a) and (a,(a,a))

<div align="center">OR</div>

Q6) a) Construct shift reduce parser for the grammar **[10]**

$S \rightarrow aABe$

$A \rightarrow Abc / b$

$B \rightarrow d$

Show the shift reduce action for 'abbcde'

  b) Consider the grammar

$S \rightarrow aSbS / bSaS/ \epsilon$

     i) show that this grammar is ambiguous

     ii) what language this grammar generates

     iii) construct the rightmost derivation for 'abab'

     iv) construct the parse tree for 'abab' **[8]**

SECTION - II

Q7) a) What are the steps will be followed at caller and callee for creation of activation record when we call the function and when we return the value from function? Explain with following example. **[12]**

```
#include<stdio.h>
int x,y;
int gcd(int u, int v)
{
if(v==0) return u;
Else return gcd(v. u%v);
}
Main ( )
{
Scan f("%d%d",&x,& y);
Printf(""%d\n" ,gcd( x,y));
Return 0;
}
```

b) What is S-attributed definition and L-attributed definition? How conversion of L-attributed to S-attributed definition is done? **[6]**

OR

Q8) a) What is syntax directed translation and syntax directed definition? How inherited attributes and synthesized attributes help for syntax directed definition and translation. **[6]**

b) Give the output of the following program using the following parameter passing methods. **[12]**

i)   pass by value   ii)   pass by reference

iii)   pass by name   iv)   pass by value result

```
#include<stdio.h>
int i =0;
Void p(int x, int y)
{
x+= 1;
i +=1;
y +=1;
}
Main ( )
{
int a[2] = {1,1}
p(a[i].a[i]);
printf "%d %d\n",a[0],a[1]):
Return 0;
}
```

Q9) a) Consider the following code that produces a 10* 10 identity matrix.**[12]**

```
for (i=1; i=10;i++)
{
for(j=1; j= 10;j++)
    {
      A[i,j]=0;
}}
for (i=1; i=10;i++)
{
A[i,i]=1:
}
```

Construct the

i)   three address code

ii)   basic blocks

iii)   flow graph

b) How do we represent the type expression and check the equivalence of two type expression given? **[4]**

<div align="center">OR</div>

Q10) a) Generate the code for following C program **[12]**

```
main ( )
{
 int i;
 int a [10];
 while(i<=10)
 a[i] = 0;
 }
```

b) What is type systems and type checking? What are the type checking functions? **[4]**

Q11) a) How are the object layout is maintain in Multiple inheritance? Why do we say c++ supports multiple programming language features? How compiler handle this inheritance **[10]**

b) What is constructor and destructor in object oriented programming? What is their significance? Explain with suitable example. **[6]**

OR

Q12) a) Compare the concept of object and classes of object oriented programming languages with procedural languages? How compiler handle objects and classes. **[10]**

b) What is constructor and destructor in object oriented programming? What is their significance? Explain with suitable example **[6]**

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P1058

[4064] - 14

B.E. (Civil)

ADVANCED TRANSPORTATION ENGINEERING

(2003 Course) (Sem. - II) (Elective - II) (401007)

Time : 4 Hours]   *[Max. Marks :100*

Instructions to the candidates:

1) *Answer Q. 1 or Q. 2, Q. 3 or Q. 4, Q. 5 or Q. 6 from section - I and Q. 7 or Q. 8, Q. 9 or Q. 10, Q. 11 or Q. 12 from section - II.*
2) *Answers to the two sections should be written in separate books.*
3) *Neat diagrams must be drawn wherever necessary.*
4) *Figures to the right indicate full marks.*
5) *Use of logarithmic tables, slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.*
6) *Assume suitable data, if necessary.*

SECTION - I

Q1) a) Explain in brief the salient features of the GQ and the N-S-E-W corridors. **[4]**

b) With a flow diagram only explain the comprehensive transport planning process in detail. **[6]**

c) Solve the following O-D matrix using the Furness Method. **[8]**

O\D	1	2	3	4	Total Present Trips	Future Predicted Trips	On Growing Factor
1	10	6	25	15	?	200	?
2	9	8	10	5	?	60	?
3	4	8	8	4	?	80	?
4	12	8	6	4	?	70	?
Total Present Trips	?	?	?	?	?	–	?
Predicted Future Trips	100	80	90	140	–	410	
Destination Growth Factor	?	?	?	?			

Q2) a) Explain in brief the salient features of the PMGSY and Bharat Jodo Pariyojana. **[4]**

b) Explain the various traffic surveys in brief highlight their importance.**[8]**

c) Explain multiple linear regression analyse and estimate the total number of trips using Modesto Model based on the following data. **[2+4]**

   i) No. of dwelling units - 2000.

   ii) No. of cars owned per dwelling unit = 3.

   iii) Average number of persons per house = 3.

   iv) Social rank index = 2.5.

   v) Urbanization index = 4.0.

Q3) a) What is BRT? What are its advantages? Why BRT implementation in Poona City has become controversial? Explain. **[1+2+5]**

b) With the help of statistical figures, explain the 4 stages of the traffic study conducted to arrive at the net ADT and hence the peak hourly traffic for the easterly bye-pass from Theur Phata to Hadapsar-Saswad road, a MSRDC project. **[8]**

OR

Q4) a) Discuss the various issues related to the urban transportation planning in India, giving suitable examples. **[8]**

b) Explain the prospects of using Intelligent road transport systems in India. **[4]**

c) Explain how the toll rates were arrived at, on the Bandra-Worli sea link. **[4]**

Q5) a) Explain the purpose of conducting economic analysis and detail out, how the benefits are worked out, in case of the 4 fly overs at SION. **[6]**

b) Explain advantages of BOT projects. **[4]**

c) Explain in brief the following methods. **[6]**

   i) PBP

   ii) NPV

<div align="center">OR</div>

Q6) a) Differentiate between financial and economic costs and detail out, how the costs are worked out, in case of the 4 flyovers at SION. **[6]**

   b) Differentiate between BOT, BOO, BOOS, BTO, with an example. **[4]**

   c) Explain in brief the following methods. **[6]**

      i)   IRR

      ii)   PI

<div align="center">

SECTION - II

</div>

Q7) a) Explain the necessity and the methodology of conducting spot and speed delay studies. **[2+4]**

   b) During a traffic survey the following data was recorded, per hour. **[10]**

      i)   Two wheelers   1000 Nos

      ii)   Cars   200 Nos

      iii)   Buses   400 Nos

      iv)   Cycles   100 Nos

      v)   Rickshaws   500 Nos

      vi)   Pedestrians   350 Nos (Total)

      1)   Work out the PCU using IS factors.

      2)   Decide the number of lanes necessary to pass the above traffic.

      3)   Determine the width of the road.

      4)   Determine the width of the foot path.

      5)   If the growth rate is 12% determine the future traffic after 20 years.

      6)   Suggest the various alternatives necessary to account for the future traffic.

Q8) a) Explain in detail the parking surveys. **[6]**

b) During a traffic survey the following counts were made per day **[4]**

i)	Cycles	14,000 Nos
ii)	Scooters	8000 Nos
iii)	Rickshaws	21,000 Nos
iv)	Private Buses	13,000 Nos
v)	Public Transport Buses	4,000 Nos
vi)	Chasis of commercial vehicles	2,000 Nos
vii)	Industrial Goods Carriers	11,000 Nos

   Calculate the CVPD, What is the use of CVPD?

c) With an example, explain the moving vehicle method in detail. **[6]**

Q9) a) Compare and contrast between flexible and rigid pavements. **[10]**

b) Work out the cumulative number of standard axles based on the following data. **[6]**

   i) Initial traffic made during counts before start of construction = 3000 CVPD in one direction.

   ii) Growth rate = 10%.

   iii) Construction period = 4 years.

   iv) Type of road = 2 lane, dual carriageway

   v) Type of terrain = plain

   vi) Type of road = National Highway

   Workout, based on IRC 37 principles.

Q10) a) Explain with sketches the various types of distresses in rigid pavements. What is PCR? How is it used? **[10]**

b) Explain the methodology of overlay design as per IRC = 81. **[6]**

Q11) A cement concrete pavement is to be designed for a 2 lane, 2 way National highway in Maharashtra State. The total 2 way traffic is 3400 CVPD at the end of the construction period. The design parameters are **[18]**

a) Flexural strength of cement concrete = 45 kg/cm².

b) Concrete grade = M 40.

c) Effective modulus of subgrade reaction = 10 kg/cm³.

d) Elastic modulus of concrete = 3×10^5 kg/cm².

e) Poisson's ratio = 0.2.

f) Coefficient of thermal expansion of concrete = 10×10^{-6} per degree C.

g) Tyre pressure = 7.5 kg/cm².

h) Traffic growth rate = 9%.

i) Spacing of contraction joints = 4.0 m.

j) Width of slab = 3.5 m.

k) Design life = 20 years.

l) Load safety factor = 1.2.

m) Maximum temperature differential during day between top and bottom of slab = 22°C.

n) 98% axle load = 15 tonnes.

o) Centre to centre distance between two tyres = 30 cm.

The single axle load spectrum obtained from the axle load survey is as follows:

Axle load class tonnes	Percent of axle loads
17 - 19	2.6
15 - 17	7.4
13 - 15	10.0
11 - 13	24.0
9 - 11	26.0
less than 9	30.0

p) Use the charts given below, for design, Check whether a slab thickness of 34 cm is functioning safely as per the IRC - 58. If not, modify the thickness so as to be safe.

Q12) For the above data, check whether 32 cm slab is safe, when modulus of subgrade reaction is 10 kg/cm³. **[18]**

Appendix-1 (Contd.)

Stresses in Rigid Pavement (Single Axle Load = 16 tons)

Appendix-1 (Contd.)

Stresses in Rigid Pavement (Single Axle Load = 18 tons)

[4064]-14   6
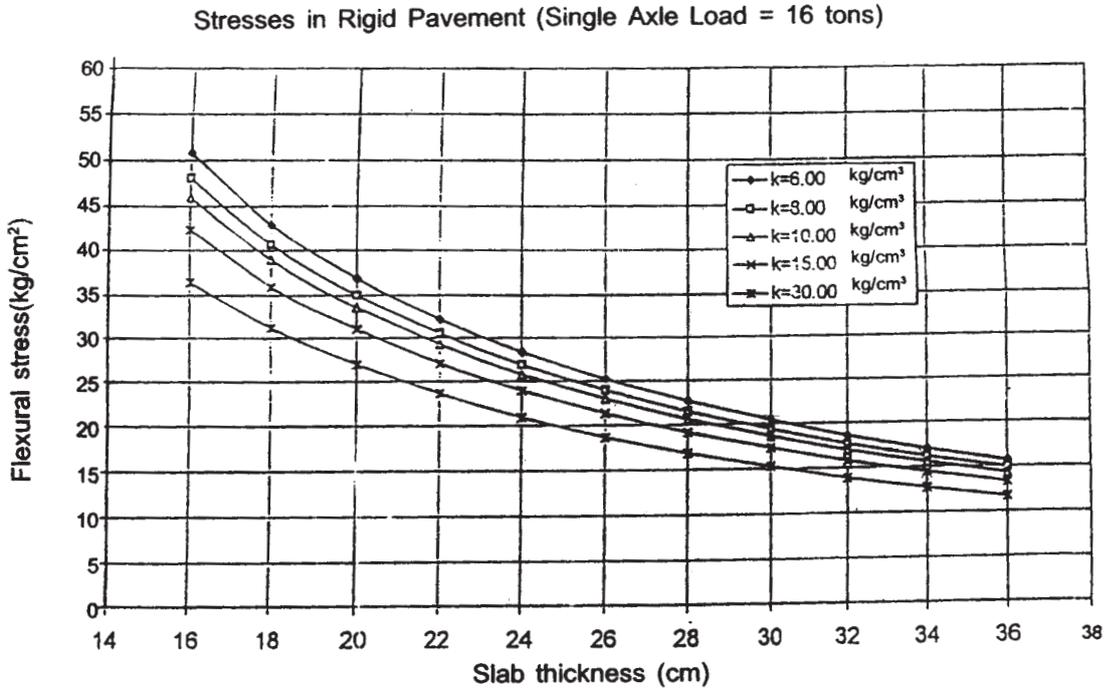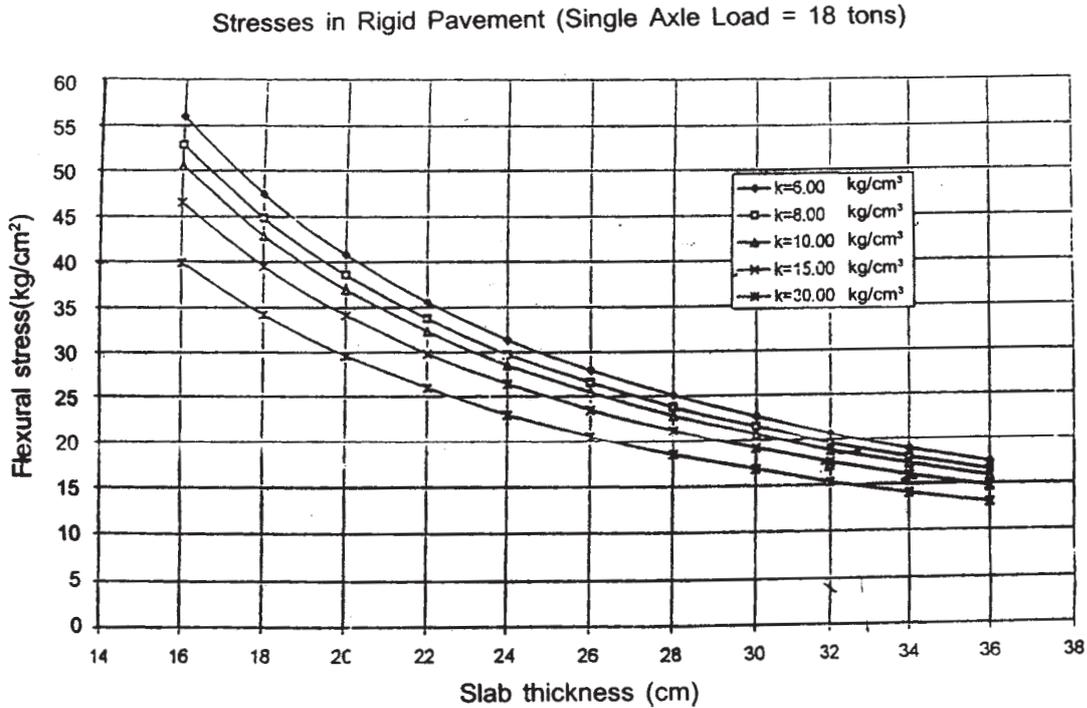
Stresses in Rigid Pavement (Single Axle Load = 20 tons)
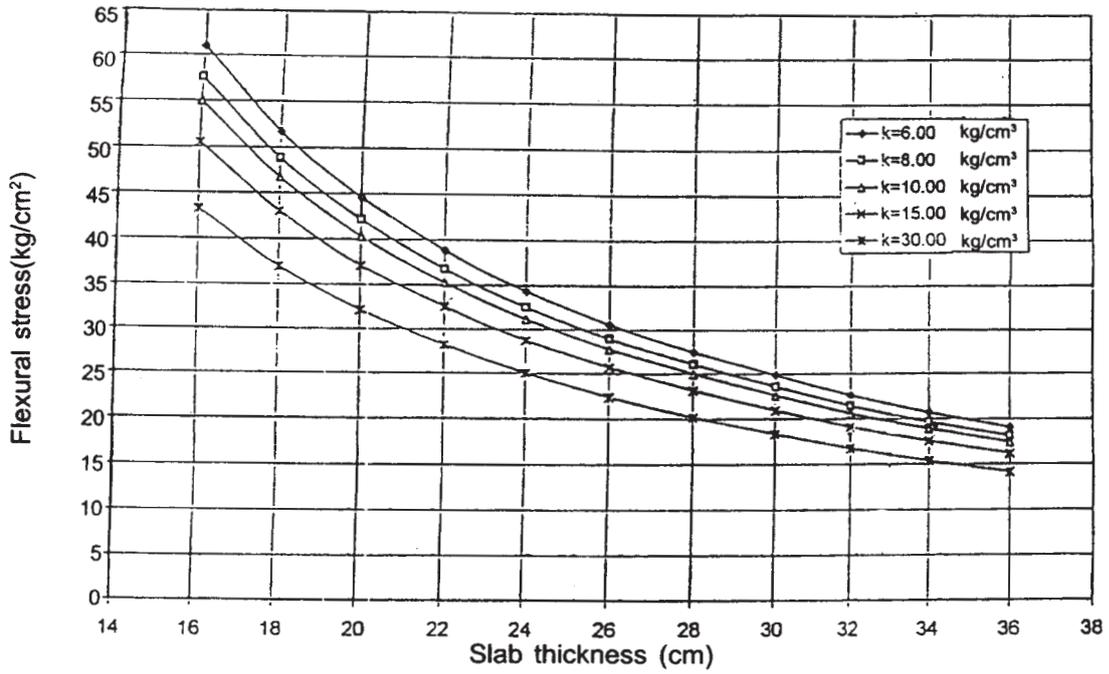
Stresses in Rigid Pavement (Single Axle Load = 22 tons)

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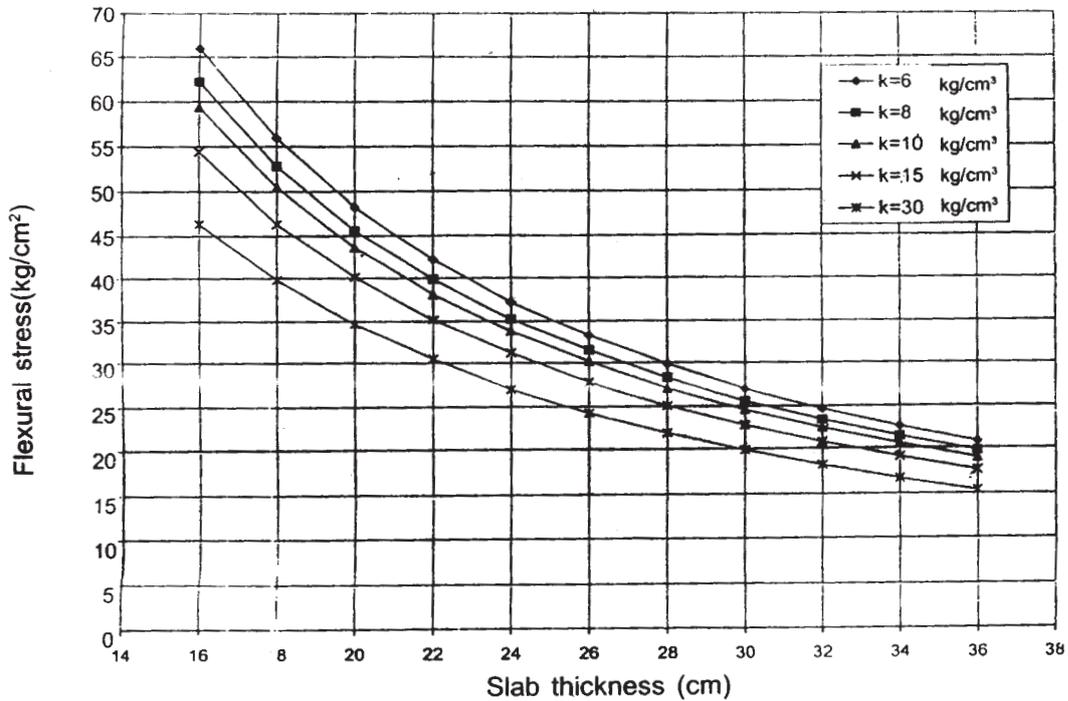
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[4064] - 34

B.E. (Mechanical Engg.)
ROBOTICS
(2003 Course) (Sem. - II) (402050) (Elective - II) (Theory)

Time : 3 Hours]   *[Max. Marks :100*

Instructions to the candidates:

    1)   *Answer three questions from section I and three questions from section II.*

    2)   *Figures to the right indicate full marks.*

    3)   *Draw suitable sketches wherever necessary.*

    4)   *Assume suitable data, if necessary.*

    5)   *Answers to the two sections should be written in separate answer books.*

    6)   *Use of electronic pocket calculator is allowed.*

SECTION - I

Q1) a) Explain why homogeneous coordinates are required in modeling of robotics manipulators. **[8]**

b) Frame{2} is rotated with respect to frame {1} about the x axis by an angle of 70º. The position of the origin frame {2} as seen from frame {1} is $^1D_2 = [7.0\ 5.0\ 7.0]^T$. Obtain the transformation matrix $^1T_2$, which describes frame {2} relative to frame { 1 }. Also, find the description of point P in the frame {1} if $^2p = [2.0\ 4.0\ 6.0]^T$. Draw frames. **[10]**

OR

Q2) a) Explain D-H Parameters. **[8]**

b) A frame {U V W} is located at a point P (15, 20, 12) with respect to {X Y Z } having axis U opposite to Z axis, axis X parallel to V axis Both frames are right handed. Determine location of point Q which is $^{XYZ}Q = (5, 15, 25)$. **[10]**

Q3) a) Explain the factors on which the number of solutions to given inverse kinematics model depends. **[8]**

b) Explain Lagrange-Euler formulation for n-DOF manipulator. **[8]**

Q4) a) Explain Inverse Kinematics of PUMA manipulator. **[8]**

b) Sketch the approximate reachable workspace of the tip of a two link planar arm with revolute joints. For this arm the first link is thrice as long as the second link and the joint limits are $30° < \theta_1 < 180°$ and $-100° < \theta_2 < 160°$. **[8]**

Q5) a) The second joint of a SCARA manipulator is required to move from $\theta_2 = 30°$ to $150°$ in 5 sec. Find the cubic polynomial to generate smooth trajectory for the joint. What is the maximum velocity and acceleration for this trajectory? **[8]**

b) Explain Industrial robot control systems. **[8]**

OR

Q6) a) What are the major differences between the open-loop and close-loop servo systems? **[8]**

(b) Describe the architecture of hybrid position/Force control. **[8]**

SECTION - II

Q7) a) Explain hydraulic grippers, with reference to the principle, use and applications. **[6]**

b) Discuss various considerations for selection of a gripper. **[6]**

c) Explain need for sensors and vision system in the working and control of a robot. **[6]**

OR

Q8) a) Write short note on, Characteristics of sensing devices. **[6]**

b) What is compliance? Explain active and passive compliance in brief. **[6]**

c) A vacuum gripper is used to lift flat steel plate of dimensions 10 mm × 500 mm × 700 mm. The gripper uses to suction cups, 120 mm in diameter each, and they are located 400 mm apart for stability. Assume a factor of safety of 1.7 to allow for acceleration of the plate. Determine the negative pressure required to lift the plates if the density of steel is 8054.3×10^{-9} kg/mm³. **[6]**

Q9) a) Explain use of strain gauges for force sensing. **[6]**

b) Write a note on redundant Robot. **[4]**

c) Explain use of robot in are welding. **[6]**

OR

Q10) a) Explain different types of speed reduction & transmission systems used in robots. **[6]**

b) Explain use of robot in the assembling. **[4]**

c) Write various technical features required of robot for spot welding and spray coating applications. **[6]**

Q11) a) Explain various performance characteristics of induction motors. **[6]**

b) Write note on stepper motor. **[6]**

c) Compare hydraulic & electrical actuator based on weight, resolution, operating pressure and cost. **[4]**

OR

Q12) a) Explain various methods used to enter the programming command into the controller memory. **[6]**

b) Explain generations of robot programming languages. **[4]**

c) Explain WAIT, DELAY, SIGNAL command with suitable examples. **[6]**

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P1060   **[4064] - 115**

B.E. (Electronics Engineering)
ROBOTICS AND INDUSTRIAL AUTOMATION
(2003 Course) (404212)(Elective - II) (Sem. - II) (Theory)

Time : 3 Hours]   *[Max. Marks :100*

Instructions to the candidates:

1) *Answers to the two sections should be written in separate books.*

2) *Neat diagrams must be drawn wherever necessary.*

3) *Figures to the right indicate full marks.*

4) *Assume suitable data, if necessary.*

SECTION - I

Q1) a) With the help of neat diagram show the components of robot system. Also explain the function of each component. **[10]**

   b) Differentiate between **[8]**

      i)   Soft and Hard Automation

      ii) Robot as a Controller and Robot as a peripheral.

                                OR

Q2) a) Explain the following terms related with Robot system. **[10]**

      i)   Work envelope

      ii)   Linear Joint and Rotary Joint.

      iii) Degree of Freedom

      iv)   Precision

      v)   Accuracy.

   b) Classify the Robots based on motion control method. State applications of each type. **[8]**

Q3) a) Explain the direct approach for obtaining inverse solution. **[8]**

   b) What is Composite Transformation Matrix? Explain the rules to be followed in the formation of the same. **[8]**

                                                      P.T.O.

OR

Q4) a) What do you mean by Screw Transformation? Write the screw transformation matrix about the first axis. **[8]**

b) Construct the link co-ordinate diagram using D-H algorithm for SCARA robot and compute the arm matrix $T_{Base}^{Tool}(q)$. **[8]**

Q5) a) Explain the principle of operation of optical proximity sensor and ultrasonic proximity sensor with neat sketch. **[8]**

b) What is the function of actuator in a Robot? Compare electrical, pneumatic and Hydraulic actuators used in Robotics. **[8]**

OR

Q6) a) With the help of neat block diagram explain the operation of LASER Range finder. **[8]**

b) What is an end effector? Name four different types of end effectors and compare them according to their functionality. **[8]**

SECTION - II

Q7) a) What is "Jacobian Singularities?" Specify. How do you compute these? **[10]**

b) Write a brief note on "Fuzzy Controllers". **[8]**

OR

Q8) a) How the straight line motion can be achieved using an articulated robot? Explain. **[10]**

b) Define trajectory of Robot. Give advantages and disadvantages of defining trajectory using work space coordinates and joint space coordinates. **[8]**

Q9) a) What do you mean by an image segmentation. Explain any two methods of image segmentation. **[8]**

b) Explain the term perspective transformation in Robotic Vision System. **[8]**

OR

Q10) a) Explain different structural illumination techniques used in Robot Vision System. **[8]**

b) With the help of neat diagram explain Robot Vision System. **[8]**

Q11) a) Explain the task planning in Robotics. **[8]**

b) Describe the fanctional relationship between a sensing elements, actuating elements and a signal transduction unit in microsensor and microactuator. **[8]**

OR

Q12) a) Discuss the term Nano robots. Explain how it is useful in Medical field? **[8]**

b) Write a brief note on "Role of Robotics in Industrial Automation". **[8]**

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[4064] - 170

B.E. (Printing)

SUBSTRATES AND INK TECHNOLOGY

(2003 Course) (Sem. - II) (408290)

Time : 3 Hours]   *[Max. Marks :100*

Instructions to the candidates:

1) *Answer to two the sections should be written in separate books.*
2) *Neat diagrams must be drawn wherever necessary.*
3) *Figures to the right indicate full marks.*

SECTION - I

Q1) a) State the advantages of multi-vat cylinder mould machine and discuss the grades of papers obtained on this machine.   **[10]**

b) Mention the grades and advantages of poly proplyne used in flexible packaging.   **[8]**

OR

a) Comment on any two: **[10]**

    i) Beater

    ii) Hydrapuler

    iii) Disc Refiner

b) Explained the qualities of paper required in printing-job- any two: **[8]**

    i) Magazines and Periodicals   ii) Map Printing

    iii) Telephone Directories   iv) Menu Card

Q2) Answer any two:

a) Explain in short Any two: **[16]**

    i) Grammage   ii) Gloss

    iii) Ash Content   iv) Stiffness

b) Which precautions will be taken while ordering the paper reel from for printing job

c) Discuss the importance of following points at the time of selection of paper
   i) Colour   ii) Caliper
   iii) Printability   iv) Texture

Q3) a) Discuss in detail the points to be considered under the indirect costing of printing job. **[8]**

b) To find the total quantity of paper required in the size 61 × 88 cms for printing 20,000 booklets in the size 210 mm × 297mm assuming each booklets contains 24 pages. **[8]**

OR

a) Calculate the total quantity of paper required in the size 45.5 × 58.5 cms for printing monthly magazine 500 copies in the size 210 mm × 297 mm assuming magazine contains 32 pages. **[8]**

b) To find the length of 60gsm paper in areel width 62cms. The weight of the reel is 300Kgs **[8]**

SECTION - II

Q4) Answer any two: **[18]**

a) What are the different drying agents used in printing inks, explain with their purpose and properties.

b) Explain UV curing Inks

c) Explain different types of pigments used for manufacturing printing inks.

Q5) Answer any one: **[16]**

a) Explain the following terms by considering Gravure printing process.
   i) Viscosity
   ii) Ink Flow
   iii) Ink Temperature

b) Explain the instruments used for various ink testing methods.

Q6) Answer any one: **[16]**

a) Explain Green printing

b) Explain the various Waste Management techniques

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P1062

[4064] - 198

B.E. (Chemical)

INDUSTRIAL HAZARDS AND SAFETY

(2003 Course) (Elective - II) (Sem. - II) (409348)

Time : 3 Hours]   *[Max. Marks :100*

Instructions to the candidates:

1) *Answers to the two sections should be written in separate books.*

2) *Neat diagrams must be drawn wherever necessary.*

3) *Figures to the right indicate full marks.*

4) *Assume suitable data, if necessary.*

SECTION - I

Q1) a) Discuss the plant layout for safety system. **[8]**

b) Explain the following: **[8]**

    i) Toxicology   ii) Dose V/s Response curve.

OR

Q2) Discuss all the details about Initiation, propagation and Termination of Accident process with suitable example. **[16]**

Q3) Derive the equations to determine the workers exposure to **[16]**

a) Toxic vapors.   b) Noise.

OR

Q4) a) Discuss the importance of Industrial Hygiene. **[8]**

b) Focus on Govt. Regulations related to Industrial safety. **[8]**

Q5) Write short notes on : **[18]**

a) BLEVE.   b) Fire Triangle.

c) Distinction between Fires & Explosions.

<div align="center">OR</div>

Q6) Write short notes on : [18]

    a) Confined and unconfined explosions.

    b) MOC.

    c) Scale of Disaster.

<div align="center">

SECTION - II

</div>

Q7) Give the design details of relief systems for risk and hazard management. [16]

<div align="center">OR</div>

Q8) Discuss the details of explosion proof equipments and instruments. [16]

Q9) Write short note on : [18]

    a) HAZOP study

    b) Process Hazard checklist and Hazard survey.

<div align="center">OR</div>

Q10) Write short notes on : [18]

    a) Review of probability Theory & Risk Assessment

    b) Event Tress and Fault Tress

Q11) a) Discuss the role of computers in safety. [8]

    b) Give the importance of safety Audit. [8]

<div align="center">OR</div>

Q12) Give the details of the following: [16]

    a) Emergency shut down system.

    b) Prevention of Hazard Human elements.

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P1063

[4064] - 280 A

B.E. (Information Technology)

ARTIFICIAL INTELLIGENCE

(Sem. - II) (2003 Course) (410451) (Elective - II)

Time : 3 Hours] [*Max. Marks :100*

Instructions to the candidates:

1) *Assume suitable data wherever necessary.*

2) *Separate answer books must be used for the sections.*

3) *Draw proper diagrams wherever necessary.*

SECTION - I

Q1) a) Explain Constraint Satisfaction with proper example. **[8]**

b) What is Hill Climbing? Explain in detail with the problems of Local Maxima, Plateu and Ridge. **[10]**

OR

Q2) a) Write Minimax Search Algorithm for two players. How can we add alpha and beta cut-offs for better performance? **[10]**

b) List and explain all Production system characteristics for AI system. **[8]**

Q3) a) Give all the nine steps to convert wff into clause form. **[9]**

b) Explain Unification Algorithm in detail. **[7]**

OR

Q4) a) Write the notes on JTMS and ATMS. **[8]**

b) Represent the following statements using Partitioned Semantic Nets. **[8]**

    i) All the birds have wings.

    ii) Raghav is taller than Krishna.

Q5) a) Explain how AI techniques can be used in Speech Processing? **[8]**

b) Give in detail the significance of Discourse Integration and Pragmatic Analysis in NLP. **[8]**

Q6) a) Explain ATN with example. **[10]**

b) Write a note on Understanding. **[6]**

SECTION - II

Q7) a) Consider the following representation from blocks world,

Start: ON(B, D) ∧ ON(C, B) ∧ ONTABLE(D) ∧ ONTABLE(A)

Goal: ON(A, B) ∧ ON(C, D) ∧ ONTABLE(B) ∧ ONTABLE(D)

i) Show how strips would solve this problem?

ii) Did these processes produce optimum plans? If not justify how can it be done? **[12]**

b) What are the various components of a typical planning system? **[6]**

OR

Q8) a) Explain Non-Linear planning with example. **[8]**

b) Write notes on Learning methods and TWEAK algorithm. **[10]**

Q9) a) Write notes on Rote Learning and Learning by taking advice. **[8]**

b) Give two typical applications of Artificial Neural Networks. **[8]**

OR

Q10) a) What is 'learning by Parameter' adjustment? Explain with example. **[6]**

b) Explain Back Propagation Neural Network in detail. **[10]**

Q11) a) Draw and explain the Architecture of Ideal Expert System. **[8]**

b) Why does PROLOG qualify to be an AI language? Discuss. **[8]**

OR

Q12) a) Write a detail note on Expert system shells. **[10]**

b) Write a Prolog program to print numbers 1 to 10 using recursion. **[6]**

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P1087   **[4064] - 137**

B.E. (E & TC)

SYSTEM PROGRAMMING AND OPERATING SYSTEMS

(2003 Course) (404225) (Elective - II) (Sem. - II)

Time : 3 Hours]   *[Max. Marks :100*

Instructions to the candidates:

   1)   Answer three questions from section I and three questions from section II.

   2)   Answers to the two sections should be written in separate books.

   3)   Neat diagrams must be drawn wherever necessary.

   4)   Figures to the right indicate full marks.

   5)   Use of logarithmic tables, slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.

   6)   Assume suitable data, if necessary.

SECTION - I

Q1) a) Mention different data structures used for language processing. Explain any one data structure in detail.   **[8]**

   b) What is compiler? Describe the different phases of compiler in detail.

                                                          [8]

OR

Q2) a) Define the term language processor and explain in detail, various language processing activities.   **[8]**

   b) Explain the following terms in detail.   **[8]**

      i)   Assemblers

      ii)   Compilers

      iii) Loaders

      iv)   Preprocessor

Q3) a) Explain data structures used for PASS-I assemblers and PASS-II assemblers. **[10]**

b) Define macro and explain nested macro calls with suitable example. **[8]**

OR

Q4) a) Describe the design of macroprocessor and machine independent features of macroprocessor. **[10]**

b) Explain various data structures that are used for PASS - II of two - pass assembler. **[8]**

Q5) a) What are the functions of loader? Explain 'Link and Go' scheme in detail. **[8]**

b) Explain in detail the direct linking loader. **[8]**

OR

Q6) a) What is program relocation and how do you perform relocation? Explain in detail. **[8]**

b) Write short note on:- **[8]**

i) Absolute loaders

ii) Dynamic linking loader.

SECTION - II

Q7) a) Define operating system. Explain types and basic functions of operating system. **[8]**

b) Explain different job scheduling in detail. **[10]**

OR

Q8) a) What is process context switching? Explain process control block. **[8]**

b) Describe deadlock and explain the different strategies to deal with the deadlock. **[10]**

Q9) a) Explain contiguous memory allocation and non-contiguous memory allocation. **[8]**

b) Explain virtual memory using paging. **[8]**

Q10) a) List and explain three file allocation methods. **[8]**

b) Write note on:- **[8]**

    i) File system reliability.

    ii) File protection

Q11) a) Explain the concept of physical IOCS in detail. **[8]**

b) What is device driver? Explain device drivers for USB. **[8]**

<div align="center">OR</div>

Q12) Write short notes on: **[16]**

    a) I/O devices.

    b) I/O organization

    c) Advanced I/O programming

    d) Disk performance.

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P1089

[4064] - 292

B.E. (Biotechnology)
FOOD BIOTECHNOLOGY
(2003 Course) (416286) (Elective - II) (Sem. - II)

Time : 3 Hours]　　　　　　　　　　　　　　　　　*[Max. Marks :100*

Instructions to the candidates:

   1)　Answer three questions from section I and three questions from section II.

   2)　Answer to the two sections should be written in separate answer books.

   3)　Neat diagrams should be drawn wherever necessary.

   4)　Figures to the right indicate full marks.

SECTION - I

Q1) a) What is meant by spoilage of food? What are the different mechanisms by which spoilage can occur? **[8]**

    b) Explain in detail, the cleaning operation for raw material preparation. **[8]**

OR

Q2) Describe in detail the different preliminary processing methods used in the food industry. **[16]**

Q3) a) Explain the process of modified atmosphere storage and packaging. **[8]**

    b) Write notes on the following: **[8]**

       i)　Dielectric heating

       ii)　Extrusion

OR

Q4) Describe in detail the various low temperature techniques used for preservation of food. **[16]**

Q5) Discuss in detail the various aspects of techniques used for microbial production of food ingredients. **[18]**

<center>OR</center>

Q6) Explain the microbial production of polysaccharides in the food industry.

<div align="right">**[18]**</div>

<center>**SECTION - II**</center>

Q7) Describe in detail the fermentation biotechnology of foods of the Indian subcontinent. **[16]**

<center>OR</center>

Q8) What is solid state fermentation? Elaborate on the different applications of SSF in the food industry. **[16]**

Q9) Write a note on the role of enzymes in the food industry. **[18]**

<center>OR</center>

Q10) Discuss applications of enzymes in the beverage and the bakery industry.

<div align="right">**[18]**</div>

Q11) Describe the various anaerobic processes for treatment of food processing wastes. **[16]**

<center>OR</center>

Q12) Write notes on the following: **[16]**

    a) Liquids wastes from the food industry

    b) Chemical methods of treating food wastes

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P1090

[4064] - 209

B.E. (Petroleum)

PETROLEUM PRODUCTION ENGINEERING - II

(2003 Course) (412389) (Sem. - II)

Time : 3 Hours]   *[Max. Marks :100*

Instructions to the candidates:

1) *Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6 from section I and Q.7 or Q. 8, Q.9 or Q.10, Q.11 or Q.12 from section II .*

2) *Answers to the two sections should be written in separate books.*

3) *Neat diagrams must be drawn wherever necessary.*

4) *Figures to the right indicate full marks.*

5) *Use of logarithmic tables, Slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.*

6) *Assume suitable data, if necessary.*

SECTION - I

Q1) a) Assume suitable data, draw the schematic graph and explain the method to determine the depth for point of gas injection, in continuous gas lift. **[10]**

b) Draw the schematic sketch of any one type of gas lift valve and explain its features. **[8]**

OR

Q2) a) Write the various suitable parameters and situation in which you will select SRP, Gas Lift and ESP. **[12]**

b) Draw the schematic sketch of various stages of continuous or intermittent gas lift system. Indicate all the features. **[6]**

Q3) a) Explain the working principle and operation cycle of 'plunger lift system'. **[10]**

b) Explain the working of progressive cavity pumping system. **[6]**

OR

Q4) Draw the schematic sketch of surface and subsurface layout of ESP installation and explain the working of any four components of it , in detail. **[16]**

Q5) a) Explain the SRP dynagraph in brief. **[6]**

b) Describe the design considerations of SRP system. **[10]**

OR

Q6) a) Discuss the working of Sucker Rod Pumping system in detail. **[12]**

b) Write the general operational problems of SRP. **[4]**

SECTION - II

Q7) a) Write the various methods to evaluate well productivity. Explain any one in brief. **[9]**

b) What is formation damage. Explain the methods to overcome it. **[9]**

OR

Q8) Write any four workover problems and their solution in brief. **[18]**

Q9) a) Draw the schematic sketch of any one method of well completion. **[6]**

b) Discuss paraffin and scale deposition problem and solution of it in brief. **[10]**

OR

Q10) a) What is petroleum production system? Discuss in brief how nodal system analysis is useful in the evaluation of petroleum production system. Write its advantages. **[8]**

b) What are the reasons of sand production through the wellbore? Write the various problems associated with it. **[8]**

Q11) a) Write the various types of pumps and explain working of any one in brief. **[8]**

b) Give the names of various equations governing flow through pipe lines and porous medium. State and explain any one equation used to calculate pressure drop, through pipe lines or porous medium. **[8]**

OR

Q12) List various methods of transportation of oil and gas. Explain pipe line transportation and its design considerations in detail. **[16]**

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[4064] - 168

P1091

B.E. (Printing)
TECHNOLOGY OF GRAVURE AND FLEXOGRAPHY
(2003 Course) (Sem. - II) (408288)

Time : 3 Hours]   *[Max. Marks :100*

Instructions to the candidates:

1) *Answers to the two sections should be written separately.*
2) *Draw neat diagrams wherever necessary.*

SECTION - I

Q1) a)   Explain in detail sections of a Gravure Press.   **[10]**

b)   Explain the applications of Gravure Process.   **[8]**

OR

a)   Explain in detail CI Flexo Press.   **[10]**

b)   Mention the benefits of Flexo process.   **[8]**

Q2) a)   Explain the impact of Pressure on Gravure printability.   **[8]**

b)   Explain the role of Doctor Blade on gravure print quality.   **[8]**

OR

a)   Write notes on: **[8]**

i)   Dry angle   ii)   Solvent based inks.

b)   Explain in detail inking system for a gravure press.   **[8]**

Q3) a)   Explain in detail web transport rollers for a Gravure press.   **[16]**

OR

b)   State Causes and Remedies of the following: **[16]**

i)   Smudging   ii)   Wrinkles

iii)   Halo   iv)   Whiskering

SECTION - II

Q4) a) Explain in detail fountain roll inking system for flexography. **[18]**

OR

b) Explain the effect of Anilox cell geometry on printability. **[18]**

Q5) a) Explain the factors affecting pressure on Gravure printability. **[8]**

b) Explain the 2-roll and 3-roll Impression System of Gravure Press. **[8]**

OR

Explain in detail impression loading system. **[16]**

Q6) a) Explain fingerprinting of a Flexo press. **[16]**

OR

b) Explain standardization of a Gravure press. **[16]**

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[4064] - 228

B.E. (Petrochemical)
REFINERY PROCESS DESIGN
(Sem. - II) (2003 Course) (412407)

Time : 3 Hours]   *[Max. Marks :100*

Instructions to the candidates:

    1)   *Answer any three questions from each section.*

    2)   *Answer to the two sections should be written in two separate answer books.*

    3)   *Figures to the right indicate full marks.*

    4)   *Use of steam tables and electronic calculator is allowed.*

    5)   *Assume suitable data where ever necessary.*

SECTION - I

Q1) a) Comment on the choice of operating pressure of distillation column by knowing plant air quality and permissible rise in cooling water temperature? Assume total condensation of a known vapor composition. **[8]**

    b) Ethane – ethylene mixture (85 mol% ethylene) is passing through a line at -25 C and 19.5 bar. Report on the possible state of the mixture as superheated vapor, vapor-liquid mixture or subcooled liquid. Justify your statement. **[10]**

Q2) Describe an appropriate method for design of tower for distillation of a multi-component hydrocarbon mixture. **[16]**

Q3) Discuss how Packie Charts can be used for the rating and design of Atmospheric Distillation Unit. **[16]**

Q4) Write notes:

    a) Importance of fouling factor. **[5]**

    b) Shell and tube heat exchanger configuration. **[5]**

    c) Utility of a process simulator. **[6]**

SECTION - II

Q5) Differentiate between rating and design of heat exchanger. Describe in detail procedure for designing of a heat exchanger in a refinery. **[16]**

Q6) State heat exchanger network synthesis problem. Discuss how it can be solved. **[18]**

Q7) How minimum L/G ratio is decided in absorption column design? With help of Perry's guidelines, discuss in detail how a tower for multicomponent absorption can be designed for separation of hydrocarbon gas mixture. **[16]**

Q8) Discuss fired heaters with reference to the following points.

    a)   Heat duty and fuel gas calculations. **[4]**

    b)   Pertinent Constructional Features. **[6]**

    c)   Where employed in a modern refinery. **[6]**

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P1097   **[4064] - 59**

B.E. (Production)

MATERIALS AND FINANCIAL MANAGEMENT

(2003 Course) (411087) (Sem. - II)

Time : 3 Hours]   *[Max. Marks :100*

Instructions to the candidates:

1) *Answer any three questions from each section.*
2) *Answers to the two sections should be written in separate books.*
3) *Neat diagrams must be drawn wherever necessary.*
4) *Figures to the right indicate full marks.*
5) *Use of logarithmic tables slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.*
6) *Assume suitable data, if necessary.*

SECTION - I
Unit - I

Q1) a) Explain various functions and objectives of materials management. **[8]**

   b) Explain briefly the probabilistic models of inventory management. **[10]**

OR

Q2) a) Derive an equation for economic batch quantity of finished good inventory when the stock outs are permitted. **[12]**

   b) 'Rate of return' can be increased by proper inventory decisions. Justify. **[6]**

Unit - II

Q3) a) Explain Supply chain of agriculture industry. State the factors to be improved for effective supply chain. **[8]**

   b) Explain the factors to be considered in warehouse design. **[8]**

OR

Q4) a) Explain economic and service benefits of logistic management. **[8]**

   b) Explain various factors that affect transportation cost. **[8]**

Unit - III

Q5) a) Explain job plan technique of value analysis. **[10]**

   b) Explain waste disposal systems. **[6]**

OR

Q6) Write short note on :

   a)   Import substitution.   **[5]**

   b)   Waste disposal system.   **[6]**

   c)   Current EXIM policies.   **[5]**

SECTION - II
Unit - IV

Q7) a)   Explain various functions and objectives of financial management.   **[8]**

   b)   Explain the important factors to be considered while determining the working capital.   **[8]**

<div align="center">OR</div>

Q8) a)   Explain 'Executive finance" and 'Routine finance' function. Enlist various sources of funds.   **[8]**

   b)   Explain and differentiate between fixed and working capital with suitable illustration.   **[8]**

Unit - V

Q9) Explain any four methods of depreciation.   **[16]**

<div align="center">OR</div>

Q10) Explain any four methods of incentive plans with illustration.   **[16]**

Unit - VI

Q11) a)   Explain types of overheads. Explain 'Primary and secondary' apportionment.   **[10]**

   b)   Explain material cost, usage, yield, mix variance with suitable illustration.   **[8]**

<div align="center">OR</div>

Q12) Write short note on :

   a)   Variance analysis.   **[6]**

   b)   Capital budgeting.   **[6]**

   c)   Marginal costing.   **[6]**

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[4064] - 113

B.E. (Electronics)

REAL TIME OPERATING SYSTEMS

(2003 Course) (404212) (Elective - II) (Sem. - II)

Time : 3 Hours]   *[Max. Marks :100*

Instructions to the candidates:

1) *Answers to the two sections should be written in separate answer books.*

2) *In section - I attempt Q.1 or Q.2, Q.3 or Q.4, and Q.5 or Q.6 in section - II attempt Q.7 or Q. 8, Q.9 or Q.10, and Q.11 or Q.12.*

3) *Neat diagrams, flow charts must be drawn and well commented pseudo code written wherever necessary.*

4) *Figures to the right indicate full marks.*

5) *Assume suitable data, if necessary.*

SECTION - I

Q1) a) Compare with diagram interrupt execution in foreground-background non preemptive and preemptive system. Show interrupts latency, interrupt response and interrupt recovery on diagram.   **[8]**

b) Compare Reentrant and Non-reentrant function with suitable example.**[4]**

c) What is priority inversion? How to overcome priority inversion?   **[4]**

OR

Q2) a) What is RMS theorem? How it is useful in assigning tasks priorities? Check whether the following set of periodic real-time tasks is schedulable under RMS on a uniprocessor system : $T_1 = (e_1 = 20, p_1 = 100)$, $T_2 = (e_2 = 30, p_2 = 150)$, $T_3 = (e_3 = 60, p_3 = 200)$.   **[8]**

b) Discuss the memory requirements in foreground/background and multi tasking system.   **[8]**

Q3) a) What is the use of following members of OS_TCB? And how they are manipulated?   **[8]**

    INT8U   OSTCBX;
    INT8U   OSTCBY;
    INT8U   OSTCBitX;
    INT8U   OSTCBitY;

b) What are different events handled using ECB in uCOSII. Explain data structure OS-EVENT.   **[8]**

OR

Q4) a) What different pools are initialized when OSInit() is executed? What is the limit on the size of the each pool? **[8]**

b) Explain, Locking and unlocking of scheduler in uCOSII, Nesting of scheduler lock, Possible situation and precautions while using scheduler lock/unlock. **[8]**

Q5) a) Enlist different MUTEX services. What configuration constants provided to configure MUTEX? **[10]**

b) Explain Mutual exclusion semaphore in uCOSII, and how it avoids the problem of Priority Inversion. **[8]**

OR

Q6) a) Explain event flag group data structure OS-FLAG-GRP and OS-FLAG-NODE. **[10]**

b) Write short note on :
   i)   Semaphore management in uCOSII.
   ii) Mutual exclusion semaphore in uCOSII.
   iii) Event flag management in uCOSII. **[8]**

SECTION - II

Q7) a) Write short note on any two : **[8]**
   i) Semaphore management in uCOSII.
   ii) Mutual exclusion semaphore in uCOSII.

b) Explain message queue as counting semaphore, explain by using pseudo code. **[8]**

OR

Q8) a) What are message queue services in uCOSII? How Message Queue services enabled/disabled in uCOSII. **[8]**

b) Explain the relationship between tasks, ISR and message queue. **[8]**

Q9) a) Explain the need of memory management services by OS as compare to compiler functions. What are memory management services in uCOSII? Explain any one of them. **[8]**

b) Define porting of uCOSII. What requirements the processor should satisfy to run uCOSII? **[8]**

OR

Q10) a) Explain memory partition and multiple memory partition in uCOSII. Explain OSMemGet() and OSMemPut() service of uCOSII. **[8]**

b) Explain uCOSII hardware/software architecture. How OS_CPU.H makes uCOSII processor and implementation specific? **[8]**

Q11) Assume appropriate data wherever necessary and consider the design and implementation of 'Temperature Controller' by using uCOSII.

a) Enlist the performance parameters, constraints and assign priorities to the defined tasks. **[6]**

b) Enlist the API required to be used for implementation. **[6]**

c) Write application code for the above system. **[6]**

OR

Q12) Assume appropriate data wherever necessary and consider the design and implementation of "Chocolate Vending Machine' by using uCOSII.

a) Enlist the performance parameters, constraints and assign priorities to the defined tasks. **[6]**

b) Enlist the API required to be used for implementation. **[6]**

c) Write application code for the above system. **[6]**

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[4064] - 135

B.E. (Electronics & Telecom.)
BIOMEDICAL ENGINEERING
(2003 Course) (404225) (Sem. - II) (Elective - II)

Time : 3 Hours]   *[Max. Marks :100*

Instructions to the candidates:

1) *Answers to the two sections should be written in separate books.*
2) *Neat diagrams must be drawn wherever necessary.*
3) *Figures to the right indicate full marks.*
4) *Assume suitable data, if necessary.*

SECTION - I

Q1) a) Explain with neat block diagram, man-machine interface of biomedical system. Give examples. **[9]**

b) Explain different types of membrane potential signals. **[9]**

OR

Q2) a) Explain different types of electronics to measure bio signals. **[9]**

b) Which are commonly uses transducers for Bio signal measurements. Explain them. **[9]**

Q3) a) Explain the Einthoren triangle and how it is used in interpretting the ECG wave form. **[8]**

b) What are different methods of blood flow measurement. Explain any one in detail, with necessary diagram. **[8]**

OR

Q4) a) Draw and explain ECG amplifier to measure output at lead II configuration. **[8]**

b) What is blood pressure? Explain any one method to measure B.P. with wave form. **[8]**

Q5) a) What is fibrillation. Explain operation of DC Defibrillator. **[8]**

b) State basic requirements of implantable pace maker. Explain operation of ventricular synchronous Demand pace maker with necessary diagram. **[8]**

OR

Q6) a) Explain the concept of vector cardiography with typpical loop pattern recorded in three planes. **[8]**

b) Explain terms :
i) Brady cardia.
ii) Brady rhythmia.
iii) Tochy cardia. **[8]**

SECTION - II

Q7) a) Explain the operation and use of spectro photo meter. **[9]**

b) Explain working of blood gas analyser with neat block diagram. **[9]**

OR

Q8) a) Explain the principle of SP O_2 measurement (oximeter). **[9]**

b) How WBC's and RBC's are separated in blood cell counter. **[9]**

Q9) a) Explain 10-20 system for EEG with necessary diagram. **[8]**

b) Draw the structur of Neuron and explain any four parts in detail. **[8]**

OR

Q10) a) Explain various EEG wave forms with their frequency and significance. **[8]**

b) What are components of central nervous system. Explain in detail. **[8]**

Q11) a) What is CT scan. What are components of X-ray system in CT scan machine. **[8]**

b) What is MRI scanning. What are differences between MRI and CT scan. **[8]**

OR

Q12) a) What are X-rays? Which techniques are used in visullation of X-rays. **[8]**

b) Explain third generation CT scanner. **[8]**

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P1104

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[4064] - 111

B.E. (Electronics)

MANAGEMENT INFORMATION SYSTEMS

(Sem. - II) (2003 Course) (404210)

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Time : 3 Hours]   *[Max. Marks :100*

Instructions to the candidates:

   1)   *Answer any three questions from each section.*

   2)   *Answers to the two sections should be written in separate books.*

   3)   *Neat diagrams must be drawn whenever necessary.*

   4)   *Figures to the right indicate full marks.*

   5)   *Use of Logarithmic tables, slide rule, mollier charts, electronic pocket calculator and steam table is allowed.*

   6)   *Assume suitable data, if necessary.*

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SECTION - I

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Q1) a)   What do you understand by the term "Convergence technology"? What are its implications for the technology industry?   **[8]**

     b)   Describe various information purposes. Elaborate how decision-making can be viewed to be the dominant purpose of using information.   **[8]**

<div align="center">OR</div>

Q2) a)   Explain key concept of MIS.   **[8]**

     b)   Why does open system view of business organization hold for its systems, sub- systems, and their, components also?   **[8]**

Q3) a)   "Information System is an orderly machine for actionable information". Comment on the requirements of the orderly machine that IS should be keeping in view implications of the real world operation. How do these requirements compare with the requirements of information systems currently in vogue?   **[10]**

     b)   Define-information integrity, information integrity risk.   **[6]**

<div align="center">OR</div>

Q4) a)   What is the basis for movement from simple to complex information systems? How does it help?   **[8]**

     b)   Explain why there is a shift from collective design decision to individual design decision with example.   **[8]**

<div align="right">**P.T.O.**</div>

Q5) a) i) "The focus of a System Dynamics study is not a system, whatever it is, but a problem."

What is the significance of "System Dynamics" methodology in studying the complex system failures? Explain with the help of an example.

ii) Consider the following "job backlog-anxiety system".

"In a situation of high backlog of work, a larger number of tasks are to be completed. which causes anxiety to rise. Rise in anxiety makes it more difficult to concentrate and complete any given task. This increases the average time to complete a task. This results in slowing down of task completion rate, which in turn has the job backlog depleted less rapidly." .

Present above system by its causal-loop representation? Is it a feedback loop? If yes, which type, negative or positive? **[9]**

b) List and briefly describe stages in approaching a problem in a system using the System Dynamics methodology. **[9]**

OR

Q6) a) " In engineering design and control, there is a subject area of "systems engineering", which is concerned with planning and design of (large) systems to achieve proper balance. performance, and economy. For example, design and development and launching into the space of a communication satellite is a systems engineering project."

What is the difference in studying a system from the "system engineering" angle and from "System Dynamics" angle? Explain with the help of an example of your choice. **[8]**

b) Describe the following System Dynamics variables : **[10]**

i) Level variable

ii) Rate variable

iii) Parameters and input variable

iv) Supplementary variable

v) Auxiliary variable.

SECTION - II

Q7) a) What do you understand by following terms? Explain with the help of example : **[8]**

   i) Closed system and Open system.

   ii) Closed loop and Open loop.

b) Develop a systems view of Integrity Information Technology Development System. In the process explain the significance of System Dynamics modeling for Integrity Information System Development. **[10]**

OR

Q8) "A good example of an open system is a cell within a human body. The cell membrane quite clearly defines the boundaries of the cell, but it also enables nutrients and information (electrical impulses from the nervous system) to enter and waste and information (electrical impulses to the nervous system) to exit. As open systems at a micro-level (cells) are enveloped in a more macro system (human body), they are referred to as nested open systems. A closed system neither imports nor exports energy, information, or material".

a) Briefly discuss what are open and closed systems? How do they differ? **[9]**

b) What is it that open systems must control and to what purpose? **[9]**

Q9) a) What do you understand by the term Total Quality Management? **[8]**

b) "I*I in computerized information system, which has a context specific application, is an interdisciplinary area". Explain briefly. **[8]**

OR

Q10) a) What is the theory of uncertainty avoidance, i.e., risk aversion? What does it state? What is its implication for decision making? **[8]**

b) Explain why "Usability Risk" by itself is irrelevant with respect to determining which decision action to choose. **[8]**

Q11) a) "Information should be seen as a composite good; a bundle of interrelated attributes. Given that information is for use, one attribute is relevance, i.e., usefulness, second is usability, and third is integrity, i.e., freedom from distortion and noise". What do you understand by this? Explain briefly. **[8]**

b) "In SEU Theory equation of information value does not account for information analysis and evaluation costs, which are the reality when information is seen as a workable mechanism for decision-making under complex and changing environment". Discuss. **[8]**

<div align="center">OR</div>

*Q12)*a) Write short notes on-Acquisition cycle, Utilization cycle, information integrity cycle under the I*I technology development. **[8]**

b) Why are existing perceptions of certainty, risk, uncertainty, and risk the concern of information economics? **[8]**

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P1105

[4064] - 262

B.E. (Computer Engineering)
DISTRIBUTED SYSTEMS
(2003 Course) (Elective - II) (Sem. - II) (410451)

Time : 3 Hours]　　　　　　　　　　　　　　　　　　　　*[Max. Marks :100*

Instructions to the candidates:

　　1)　Answer any three questions from each section.

　　2)　Answers to the two sections must be written on separate answer books.

　　3)　Draw sketches whenever necessary.

　　4)　Figures to the right indicate full marks.

SECTION - I

Q1) a)　Explain different scalability techniques in distributed system.　　**[6]**

　　 b)　Explain what is transparency in a Distributed System, and give examples of different forms of transparency.　　**[6]**

　　 c)　Consider a simple server that carries out client requests without accessing other servers. Explain why it is generally not possible to set a limit on the time taken by such a server to respond to a client request. What would need to be done to make the server able to execute requests with a bounded time?　　**[6]**

OR

Q2) a)　What is open distributed system and what benefits does openness provides?　　**[6]**

　　 b)　Use the World Wide Web as an example to illustrate the concept of resource sharing, client and server.　　**[6]**

　　 c)　What is the role of middleware in a distributed system?　　**[6]**

Q3) a)　Explain parameter passing issues in Remote Procedure Call.　　**[8]**

　　 b)　Explain the architecture of message oriented middleware.　　**[8]**

<div align="center">OR</div>

Q4) a) Explain how quality of service can be achieved in stream oriented communication. **[10]**

   b) What is RMI? What is difference between static and dynamic RMI? **[6]**

Q5) a) Explain different solutions to locating mobile entities in distributed system. **[10]**

   b) Explain the approaches for caching file data in NFS. **[6]**

<div align="center">OR</div>

Q6) a) Explain how Coda allows file servers to be replicated. Explain the strategy used by Coda for file replication. **[6]**

   b) Explain general organization of Plan 9 file-based distributed system. **[6]**

   c) Explain OSI X.500 directory service. **[4]**

<div align="center">

SECTION - II

</div>

Q7) a) Explain different clock synchronization algorithms. **[8]**

   b) Explain Ricart and Agrawala's algorithm for mutual exclusion. **[6]**

   c) Explain with the example, nested transactions in distributed system. **[4]**

<div align="center">OR</div>

Q8) a) Explain the global state of a distributed system. Explain how to record global state of a distributed system. **[8]**

   b) Compare Bully algorithm with Ring algorithm. **[6]**

   c) Systems that use locking for concurrency control usually distinguish read locks from write locks. What should happen if a process has already acquired a read lock and now wants to change it into a write lock? What about changing a write lock into a read lock? **[4]**

Q9) a) Consider a Web browser that return an outdated cached page instead of a more recent one that had been updated at server. Is this a failure, and if so, what kind of failure? **[8]**

   b) Explain the different schemes for scalable reliable multicasting? **[8]**

Q10) a) Explain five different classes of failures that can occur in RPC Systems.

[8]

b) Explain Byzantine generals problem with possible solutions. **[8]**

Q11) a) Explain object invocation models supported in CORBA. **[6]**

b) Explain the differences between grid computing and cluster computing.

[6]

c) Explain different types of clusters. **[4]**

<div align="center">OR</div>

Q12) a) How is fault tolerance implemented in CORBA? **[6]**

b) Explain different elements of Grid. **[6]**

c) Explain the features of Grid Computing. **[4]**

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P1107

[4064] - 54

B.E. (Production)

OPERATIONS RESEARCH

(2003 Course) (Sem. - I) (411084)

Time : 3 Hours]　　　　　　　　　　　　　　　　　*[Max. Marks :100*

Instructions to the candidates:

　1)　*Attempt either Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6 from section I and Q.7 or Q. 8, Q.9 or Q.10,Q.11 or Q.12 from section II .*

　2)　*Answers to the two sections should be written in separate answer books.*

　3)　*Neat diagrams must be drawn wherever necessary.*

　4)　*Figures to the right indicate full marks.*

　5)　*Use of electronic pocket calculator is allowed.*

　6)　*Assume suitable data, if necessary.*

SECTION - I

Unit - I

Q1) a) Explain the applications of linear programming in any two fields. **[6]**

　　　b) Reddy mikks produces both interior and exterior paints from two raw materials M1 and M2. The following table provides the basic data of the problem. **[12]**

	Tons of raw material per ton of		Maximum daily
	Exterior paint	Interior paint	availability (Tons)
Raw material M1	6	4	24
Raw material M2	1	2	6
Profit per ton (Rs)	5	4	

A market survey indicates, the daily demand for interior paint cannot exceed that of exterior paint by more than 1 ton. Also, the maximum daily demand of interior paint is 2 tons. Determine the best product mix.

OR

Q2) a) Explain the concept of duality theory. **[6]**

b) A firm has two bottling plants, A & B. Each plant makes three drinks D1, D2 and D3. The number of bottles produced per day are as given in the table. **[12]**

Drink	Plant at	
	A	B
D1	15,000	15,000
D2	30,000	10,000
D3	20,000	50,000

A market survey indicates a demand of 2,00,000 bottles of D1, 4,00,000 bottles of D2 and 4,40,000 bottles of D3. The operating cost per day at plant A is 600 and B is 400 respectively. How many days each plant should run in that month so as to minimize the production cost and still meeting the market demand? Solve by Dual method only.

Unit - II

Q3) a) "An assigment problem is a special case of transportation problem". Explain. **[6]**

b) The following table gives the cost of assigning any one operator to any one machine. **[10]**

		Operator			
		I	II	III	IV
	A	10	5	13	15
Machine	B	3	9	18	3
	C	10	7	3	2
	D	5	11	9	7

Find the optimal assignment.

OR

Q4) a) Write the steps for solving the assignment problem. **[6]**

b) Cars are slipped from three distribution centers to five dealers as given in the table. Solve for the optimum transportator cost meeting all the demand and supply. **[10]**

	Dealer					
	1	2	3	4	5	Supply
1	100	150	200	140	35	400
Center 2	50	70	60	65	80	200
3	40	90	100	150	130	150
Demand	100	200	150	160	140	

Unit - III

Q5) a) Explain the Gomory's cutting plane algorithm. **[6]**

b) Find the solution of the following integer LPP. **[10]**

Maximize $Z = 2x_1 + 3x_2$

Subject to $6x_1 + 5x_2 \leq 25$

$x_1 + 3x_2 \leq 10$

x_1, x_2 non-negative integers.

OR

Q6) a) Explain branch and bound method. **[6]**

b) Write a short note on: **[10]**

i) Goal programming.

ii) Parametric programming.

SECTION - II

Unit - IV

Q7) a) Explain the steps involved in Monto-Carlo simulation. **[6]**

b) Find the cost/period of individual replacement policy of an installation of 300 light bulbs. Given that the cost of replacing an individual bulb is Rs. 2. Calculate cost and the number of light bulbs that would fail during each week if the conditional probability of failure per week is as given below: **[10]**

Week number	0	1	2	3	4
Conditional cumulative probability of failure	0.0	0.10	0.30	0.70	1.00

OR

Q8) a) Explain briefly Geometric programming. **[6]**

b) Explain the steps followed for simulation by montecarlo simulation method and advantages of simulation. **[10]**

Q9) a) Explain your understanding of the relationship between the arrival rate λ and the average interarrival time. What are the units describing each variable? **[6]**

b) The time between arrivals at the gate in industry is exponential with mean 10 minutes. What is the arrival rate per hour? What is the probability that no worker will arrive at the gate during the next 15 minutes? **[10]**

OR

Q10) a) What are the pure and mixed strategies? Explain the "best strategy" on the basis of minimax criteria. **[6]**

b) Solve the following 2 × 3 game. **[10]**

		Player B		
		B1	B2	B3
Player A	A1	1	3	11
	A2	8	5	2

Unit - VI

Q11) a) Write short notes on: **[8]**

i) Resource smoothing.

ii) Crashing of network.

b) The following information of a small project is given in Number of weeks for completion. **[10]**

Activity	Pessimistic time	Most likely Time	Optimistic Time
1 - 2	9	6	3
2 - 3	6	4	3
2 - 4	8	6	4
3 - 5	6	4	2
4 - 6	8	6	4
5 - 6	6	4	2
5 - 7	5	7	3
6 - 7	8	10	2

Draw the network diagram, find critical path and Expected project length.

Q12) a) Differentiate CPM and PERT. **[8]**

b) The following information of a small project is given in number of days for completion. Draw the project network. Find critical path and expected project length. **[10]**

Activity	Estimated duration (days)		
	Optimistic	Most likely	Pessimistic
1 - 2	1	4	7
1 - 3	5	10	17
2 - 4	3	6	9
2 - 6	1	4	7
3 - 4	2	4	8
3 - 5	2	5	8
4 - 5	1	4	7
5 - 6	2	4	8

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P1114

[4064] - 405

B.E. (Civil)

SYSTEMS APPROACH IN CIVIL ENGINEERING

(2008 Course) (Elective - I) (Sem. - I) (401004 (B))

Time : 3 Hours]   *[Max. Marks :100*

Instructions to the candidates:

1)   Answer three questions from section I and three questions from section II.

2)   Answers to the two sections should be written in separate books.

3)   Neat diagrams must be drawn wherever necessary.

4)   Figures to the right indicate full marks.

5)   Use of logarithmic tables, slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.

6)   Assume suitable data, if necessary.

SECTION - I

Q1) a) Maximize $Z = 3x_1 + 4x_2 + x_3 + 5x_4$ **[10]**

Subject to

$8x_1 + 3x_2 + 2x_3 + 2x_4 \leq 10$

$2x_1 + 5x_2 + x_3 + 4x_4 \leq 5$

$x_1 + 2x_2 + 5x_3 + x_4 \leq 6$

$x_1, x_2, x_3, x_4 \geq 0$

b) Explain following terms used in Simplex method.   **[6]**

i)   Key column   ii)   Key row

iii)   Degeneracy   iv)   Infeasibility

OR

Q2) a) Solve following problem using two phase simplex method   **[10]**

Minimize $Z = 8x_1 + 4x_2 + 2x_3$

Subject to

$4x_1 + 2x_2 + x_3 \leq 8$

$3x_1 + 2x_2 \leq 10$

$x_1 + x_2 + x_3 \geq 4$

$x_1, x_2, x_3, \geq 0$

b) What is sensitivity analysis? How it affects the simplex method?   **[6]**

Q3) a) Solve following transportation problem for which origin availabilities & destination requirements are given below: **[12]**

	D_1	D_2	D_3	D_4	D_5	D_6	a_i
O_1	1	2	1	4	5	2	30
O_2	3	3	2	1	4	3	50
O_3	4	2	5	9	6	2	75
O_4	3	1	7	3	4	6	20
	20	40	30	10	50	25	175 Total

Solve the example by

i) North West Corner method.

ii) Row minima method.

iii) Column minima method.

b) Give mathematical formulation of the transportation and simplex method. What are the differences in the nature of problem that can be solved by these methods? **[6]**

OR

Q4) a) Find the optimal assignment for the following assignment problem with the following cost matrix. **[12]**

	I	II	III	IV	V	VI
A	25	23	28	12	16	25
B	52	20	27	16	15	15
C	60	36	40	55	28	17
D	16	27	12	24	25	19
E	18	19	28	17	56	70
F	29	15	20	30	40	55

b) Formulate the L.P. Model of the above example. **[6]**

Q5) a) Find the minimum of $f = x^2(x - 2)$ in the interval (0.0, 2.0) with three iterations using Dichotomous search method. **[10]**

b) What is the difference between Dichotomous search and Golden section method? **[6]**

Q6) a) Define Fibonacci numbers. **[2]**

b) Use Fibonacci method to maximize $Z = 10x^2 - 4x^3$ in the interval (0, 2) with n = 5 upto 3 iterations. **[10]**

c) Explain Hessian matrix with its significance. **[4]**

SECTION - II

Q7) a) Write a short note on non-linear programming. **[4]**

b) Use method of Lagrangian multiplier to solve the following **[12]**

Minimize $Z = 3x_1^2 + 2x_2 + 3x_3^2 + 10 x_1 + 9x_2 + 16x_3 - 50$

Subject to

$2x_1 + x_2 + 2x_3 = 40$

$x_1, x_2, x_3, \geq 0$

OR

Q8) a) Explain following terms: **[8]**

i) Local and Global optima.

ii) Concave and convex function.

b) Verify whether the following function is convex or concave and find the maximum or minimum solution point. **[8]**

i) $f(x) = 2x_1x_2 - 2x_1^2 - x_2^2$.

ii) $f(x) = x_1^2 + 3x_1x_2 + 3x_2^2$.

Q9) a) Explain the importance of sequencing problem what are the various methods of solving sequencing problem? Briefly explain them. **[8]**

b) A foreman wants to process four different jobs. The sequence of operation is B-C-A. Decide the optimal sequence for the four jobs to minimize the time elapsed from start of the first job to the end of last job if the process times are. **[8]**

Job	Machine A	Machine B	Machine C
1	12	5	18
2	19	28	14
3	18	16	13
4	23	10	18

Also find the idle time for each job and each machine.

OR

Q10) a) Explain the following term related to queuing with neat diagram. **[8]**

   i)   Arrival pattern   ii) Service discipline.

   iii) Service channel   iv) Service distribution.

b) A study of past 200 days says that demand for a dumper has fluctuated between 0 to 5 trips/week with the frequency as follows: **[8]**

Trips/week	0	1	2	3	4	5
Frequency	10	22	28	62	35	20

Using the following random numbers, simulate the demand for a ten week period

66 96 24 33 86 22 19 59 91 37

Q11) a) Explain how the theory of replacement is used in replacement of items whose maintenance cost varies with time. **[6]**

b) A contractor finds from his past records that the costs per year of running a machine whose purchase price is Rs 16,000 are given below: **[12]**

Year	1	2	3	4	5	6	7
Running cost in Rs	2000	2200	2400	2800	3300	3800	4400
Resale value in Rs.	10000	9500	9000	8500	7000	6000	5000

Determine at what stage is the replacement due.

OR

Q12) a) Write short note on game theory. For what type of business problem. The game theory might be useful. Explain by giving example. **[6]**

b) Solve following game **[12]**

	I	II	III	IV	V
a	10	7	8	9	5
b	4	6	10	7	8
c	3	5	6	5	3
d	6	2	3	3	2

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[4064] - 579

P1140

B.E. (Polymer Engg.)
MECHANICS OF COMPOSITES
(2008 Course) (Elective - I) (Sem. - I) (409364 B)

Time : 3 Hours]   *[Max. Marks :100*
Instructions to the candidates:
1) *Answers Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6 from section I and Answer Q.7 or Q. 8, Q.9 or Q.10, Q.11 or Q.12 from section II.*
2) *Answers to the two sections must be written in separate answer books.*
3) *Figures to the right indicate full marks.*
4) *Use of scientific calculator, log paper log-log paper is allowed*
5) *Assume suitable design data, if required.*

SECTION - I

Q1) a) For a lamina having unidirectional fibers at 45°, find   **[9]**
   i)   Transformed compliance matrix.
   ii)   Transformed reduced stiffness matrix.
   If applied stress system is

   6x = 2 MPa   6y = – 2MPa   exy = 2MPa

   Find:-
   iii) Global strains.
   iv)   Local strains.
   v)   Principle stresses.
   vi)   Maximum shear stress.
   vii) Local stresses.
   viii) Principle strains.
   ix)   Principle shear strains.
   Given
   Fiber volume fraction = 0.5
   E_1 = 181 GPa
   E_2 = 15 GPa

   Major poisson's ratio $\sqrt{}_{12}$ = 0.3

   Shear modulus G_{12} = 5 GPa.

b) Define coefficient of mutual influence of the first kind $\eta_{i, ij}$ and coefficient of mutual influence of the second kind $\eta_{ij, i}$. **[4]**

c) The reduced stiffness matrix (Q) of an orthotropic lamina is given below. Find engineering constants E_1, E_2, G_{12} and ν_{12}. **[3]**

$$[Q] = \begin{bmatrix} 150 & 5 & 0 \\ 5 & 25 & 0 \\ 0 & 0 & 10 \end{bmatrix} \text{GPa}$$

OR

Q2) a) Prove the condition of symmetry of stiffness matrix for orthotropic material, $C_{ij} = C_{ji}$ **[5]**

b) Determine poisson's ratio, ν_{xy} at an angle $\theta = 45°$ if following conditions about the lamina are known. **[5]**

$$\frac{E_1}{E_2} = 5 \qquad \frac{G_{12}}{E_2} = 0.75 \text{ and } \nu_{12} = 0.25.$$

c) Write plane stress condition for an orthotropic lamina and give compliance matrix in terms of engineering constants. **[4]**

d) Write expressions for calculating transformed reduced stiffness matrix $[\overline{Q}]$ and transformed reduced compliance matrix $[\overline{S}]$ from reduced stiffness matrix [Q] and reduced compliance matrix [S]. **[2]**

Q3) a) Show that uniaxial off - axis Tsai - Hill failure criterion reduces to

$$\frac{\text{Cos}^4 \theta}{X^2} + \left[\frac{1}{S^2} - \frac{1}{X^2} \right] \text{Cos}^2 \theta \, \text{Sin}^2 \theta + \frac{\text{Sin}^4 \theta}{Y^2} = \frac{1}{6X^2}$$

Where X and Y represent tensile (or compressive) failure strengths in 1 and 2 direction S = shear strength in 1 - 2 plane. **[6]**

b) State Hoffman Failure criterion for orthotropic lamina and discuss its advantages. **[6]**

c) Determine the coefficients of thermal expansion α_1 and α_2 of a Uni-direchonal glass - epony lamina having following properties. **[6]**

$E_{fiber} = 70$ GPa $\qquad E_{matrix} = 4$ GPa

$\nu_{fiber} = 0.2 \qquad \nu_{matrix} = 0.35$

$\alpha_{fiber} = 4.5 \times 10^{-6} / °C$

$\alpha_{matrix} = 90 \times 10^{-6} / °C$

volume fraction of fiber $= 0.6$

Q4) a) A filament wound pressure vessel has fibers wound at 45° to longitudinal axis. Internal diameter of the vessel is 1 meter and thickness is 10 mm. Find the maximum internal pressure the vessel will sustain according to maximum stress theory and also by Tsai-Hill theory. **[8]**

The engineering properties of the lamnia are

$E_1 = 30$ GPa $\qquad\qquad$ $E_2 = 5$ GPa

$G_{12} = 2$ GPa $\qquad\qquad$ $\nu_{12} = 0.2$

The failure strengths are as follows:

Tensile failure strength in 1-direction = 1000 MPa.

Compressive failure strength in 1-direction = 500 MPa.

Tensile failure strength in 2-direction = 25 MPa.

Compressive failure strength in 2-direction = 150 MPa.

Shear strength in 1-2 direction = 60 MPa.

b) Reduce maximum strain failure criterion to unidirectionally fiber reinforced composite subjected to uniaxial load at an angle θ. **[7]**

c) Write expression for Tsai - Hill failure criterion subjected to tensile stress in direction 1, compressive stress in direction 2 and positive shear stress in 1-2 plane. **[3]**

Q5) a) Give tensor notation system for representing stresses and strains. Also give sign convention. **[5]**

b) Explain why direction of shear stress is critically important in determining the strength and modulus of an orthotropic or anisotropic material. **[5]**

c) Using mechanics of materials approach to stiffness, prove that in plane shear modulus of lamina, G_{12} is given by **[6]**

$$G_{12} = \frac{Gm\ Gf}{Vm\ Gf + Vf\ Gm}$$

where m refers to matrix and f refers to fibers. Vm and Vf are matrix and fiber volume fractions. Explain why G_{12} is matrix dominated.

Q6) a) Using mechanics of materials approach, show that transverse young's modulus is given by

$$E_2 = \frac{Ef\ Em}{Vm\ Ef + Vf\ Em}$$

Where m refers to matrix and f refers to fibers. Vm and Vf are matrix and fiber volume fractions respectively. Also show that E_2 is matrix dominated. **[8]**

b) Analyse. Halpin - Tsai equations for various values of Σ and η. State significance of these equations. Show that these equations reduce to upper and lower bounds of composite modulus. **[8]**

SECTION - II

Q7) a) A 3 ply laminate is as shown below **[12]**
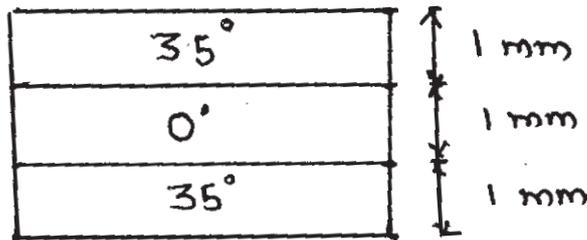
$$[\overline{Q}]_{(0°)} = \begin{bmatrix} 12.5 & 0.271 & 0 \\ 0.271 & 0.785 & 0 \\ 0 & 0 & 0.44 \end{bmatrix} \times 10^4 \text{ MPa}$$

$$[\overline{Q}]_{(35°)} = \begin{bmatrix} 6.3 & 2.7 & 3.7 \\ 2.7 & 2.2 & 1.9 \\ 3.7 & 1.9 & 2.9 \end{bmatrix} \times 10^4 \text{ MPa}$$

i) Calculate [A], [B], [D] matrices.

ii) If force per unit width Nx = 5000 N/mm is applied, calculate stresses and strains in individual plies. Show stresses and strains graphically.

b) Discuss

    i)   Regular symmetric cross ply laminate

<div align="center">OR</div>

    ii)   Quasi - Isolropic laminate.   **[6]**

<div align="center">OR</div>

Q8) a) A $[0/90]_s$ laminate made out of glass - epoxy laminae has following engineering properties: **[12]**

    E_{11} = 140 GPa E_{22} = 10 GPa G_{12} = 5 GPa ν_{12} = 0.3. Assume thickness of each ply equal to 0.125mm. Compute [A], [B], [D] matrices.

b) Compute force and moment resultants for a single layered isotropic laminate with thickness equal to 2 mm. What would be force and moment resultants if laminate has three layers with total thickness of 6 mm?

    Given E = 150 MPa ν = 0.3.   **[6]**

Q9) a) Determine the number of 0°, 90° and ± 45 orientation in a $[0/90/ \pm 45]_s$ laminate that meets the following criteria:

    i)   Minimum strength in axial (0°) direction = 340 MPa.

    ii)   Minimum modulus in the axial (0°) direction = 65 MPa.

    Total laminate thickness is 3 mm. Refer to charts in fig 1.   **[8]**

b) A square plate of sides 0.5 m and thickness 10 mm is simply supported carrying a uniformly distributed load of 25 N/m². Determine the maximum deflection in the plate considering that the plate has symmetric cross ply $[0/90]_s$ Given   **[8]**

$$[Q]_{(0°)} = \begin{bmatrix} 150 & 4 & 0 \\ 4 & 12 & 0 \\ 0 & 0 & 7 \end{bmatrix} \text{GPa}$$

Assume each ply thickness to be same.
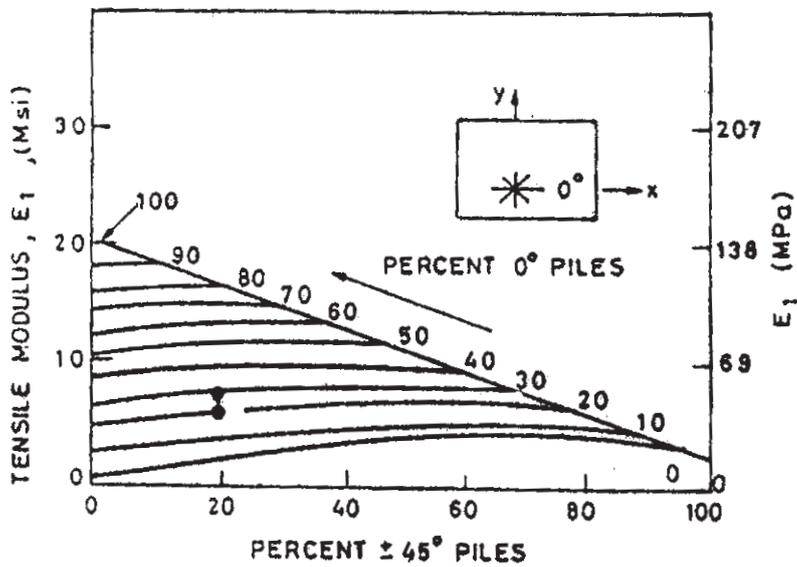
Carpet plot for stiffness
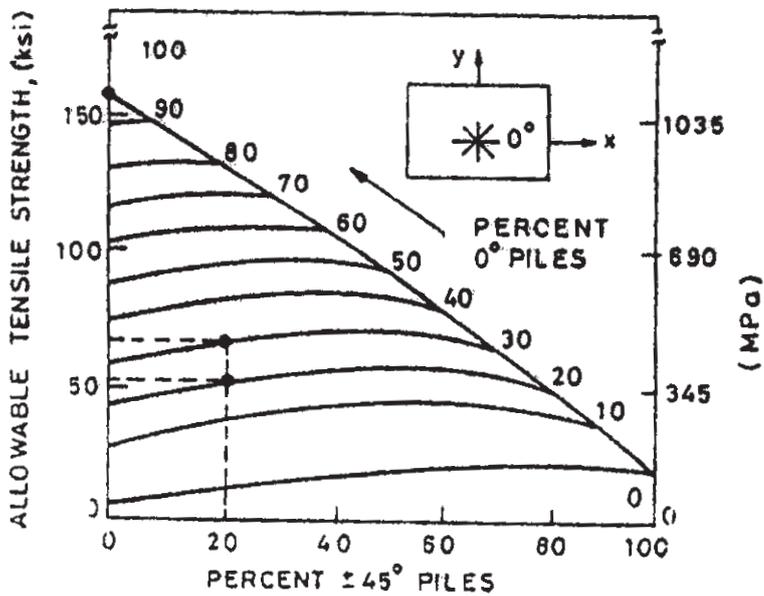
Carpet plot for strength

Fig 1

Q10) a) Determine the effective bending stiffness for a [0/90/0]$_s$ Eglass - epony beam having a rectangular cross section of 12.5 mm × 4.8 mm thick. Assume each layer in the beam has same thickness. **[8]**

Given -

	Modulus (GPa)	Strength (MPa)
0°	4.8	1100
90°	0.3	96.5

Take density as 1.8 gms/cc

b) Write down equilibrium equations for bending of a transversly loaded isotropic plate. **[4]**

c) Draw at least Four types of bonded joints and state merits/demerits in short. **[4]**

Q11) a) What is non-destructive evaluation technique? Explain the Acoustic emission technique. **[6]**

b) With a neat sketch explain any one Interlaminar shear test. **[4]**

c) Explain laser shearography technique. **[6]**

OR

Q12) a) Write in short about low energy impact tests used in composites. **[5]**

b) Explain the test set up for either three point or four point bending test. **[5]**

c) List various tests used for measurement of in plane shear properties. Explain any one in detail with respect to measurement of shear stress, shear strain and modulus. **[6]**

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P1174

[4064] - 545

B.E. (Petroleum Engineering)
RESERVOIR ENGINEERING - II
(2008 Course) (412381) (Sem. - I)

Time : 3 Hours]   *[Max. Marks :100*

Instructions to the candidates:

   1)   *Answers to the two sections must be written in separate answer books.*

   2)   *Questions No 4 (four) and 8 (eight) are compulsory.*

   3)   *Figures to the right indicate full marks.*

   4)   *Neat diagrams must be drawn wherever necessary.*

   5)   *Use of a non-programmable calculator, log-log, semi-log paper is allowed.*

   6)   *Assume suitable data if necessary.*

   7)   *If you attempt question 2, detach figure 2 a,b and attach inside the answer booklet.*

   8)   *If you attempt question 5, detach figure 5 and attach inside the answer booklet.*

   9)   *If you attempt question 6, detach figure 6 a,b and attach inside the answer booklet.*

SECTION - I

Q1) Derive the diffusivity equation in cylindrical co-ordinate system.   **[16]**

Q2) (If you attempt this question, attach Figure 2a,b inside the answer booklet)

                                                                                                   [16]

    Analyse the well test in Figure 2a,b.

    Given data is : q = 185 stb/d, h = 114 ft, phi = 30, $ct = 4\times10^{-6}$/psi, mu = 2.2 cp, Bo = 1.1, rw = .5 ft, FBHP = 2820 psia, tp = 540 hrs.

Q3) Draw a typical DST graph. From a well testing view point, how do you analyse it?   **[16]**

Q4) Write short notes: **[18]**

    a)   Line Source Solution.

    b)   ETR, MTR, LTR.

    c)   Pressure regimes.

SECTION - II

Q5) a) What is pseudo pressure, why is it required? **[3]**

b) (If you attempt this question, attach Figure 5 inside the answer booklet). For the gas well test in the figure 5, find permeability and skin factor for pressure, pressure squared and pseudo pressure (ψ, PP) analysis. Show ETR, MTR, LTR clearly on graph. Data: q = 1100 MSCF/D, tp = 2940 minutes, Tr = 248 F, Porosity = 7.7, rw = 0.2 ft, ct = 1.26E-4, viscosity = 0.0216 cp, h = 8ft, A = 320 acre, average reservoir pressure = 3567 psi, z = 0.9305, gas gravity = 0.7, Pwf = 2292, ψ (Pwf) = 3460 × 10^5. **[10]**

c) Which analysis do you believe, why? **[3]**

Q6) (If you attempt this question, attach Figure 6 a,b inside the answer booklet) Given a Well Test in Figure 6 a,b, Analyse it. **[16]**

Given data is:

rw = 0.3ft, phi = 0.05, mug = 0.01118 cp, h = 286 ft, ct = 0.002685, Bg = 6.48012 RB/Mscf, qlast = 149 Mscf/D, tp = 19836 hours.

Q7) Given the following data: **[16]**

Time (year)	THP (psi)	qo (1000 BBL/D)
1988	100	5
1990	80	4
1992	70	3
1994	60	2

What is the oil production in 1996 using harmonic, exponential and hyperbolic decline?

Q8) Define and explain the pressure derivative. Draw and explain the diagnostic plot giving five examples. **[18]**

Figure: 2 a

Figure 2b

Figure 5

y-axis: p, p^2x10^3, PPx10^5

y-axis values: 0, 2000, 4000, 6000, 8000, 10000, 12000, 14000

x-axis: Horner time

x-axis values: 1, 10, 100, 1000

Legend:
◆ Pressure
■ Pressure Squared
▲ Pseudo Pressure
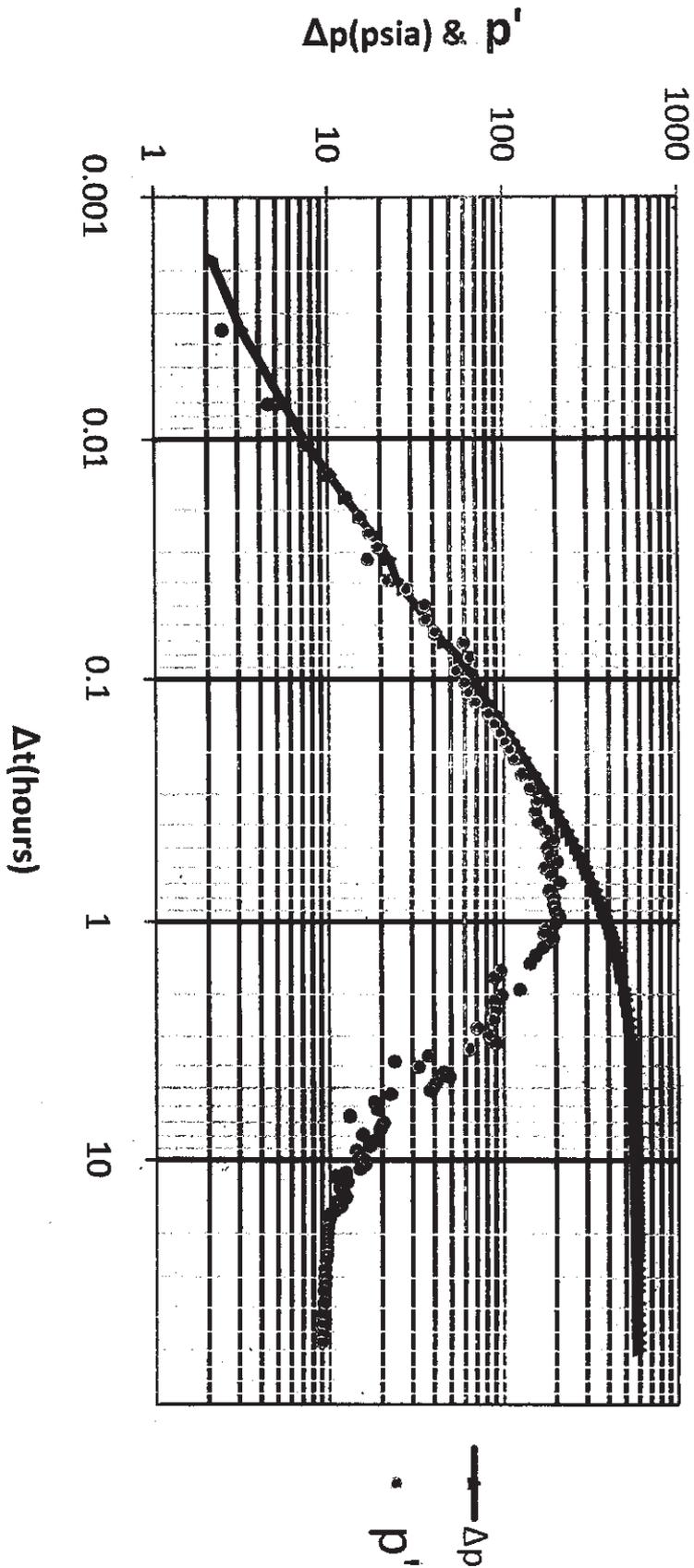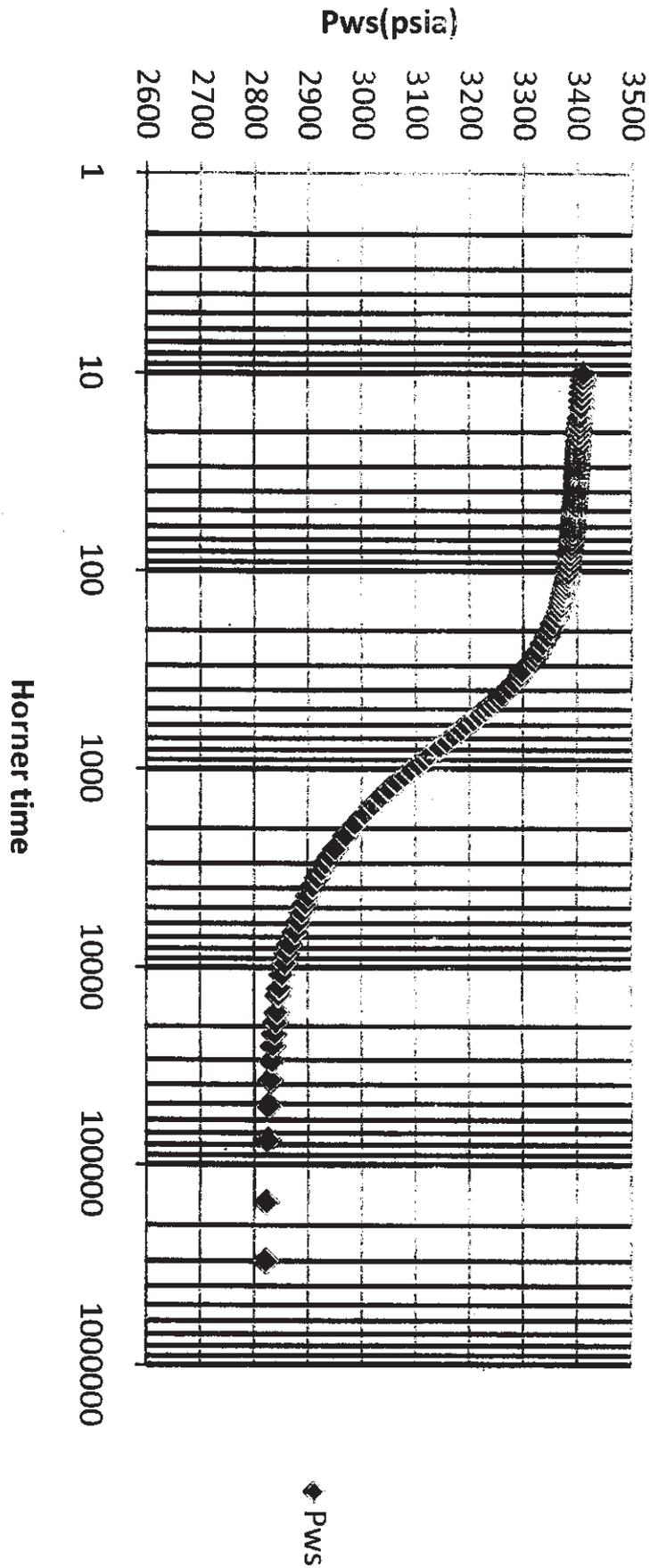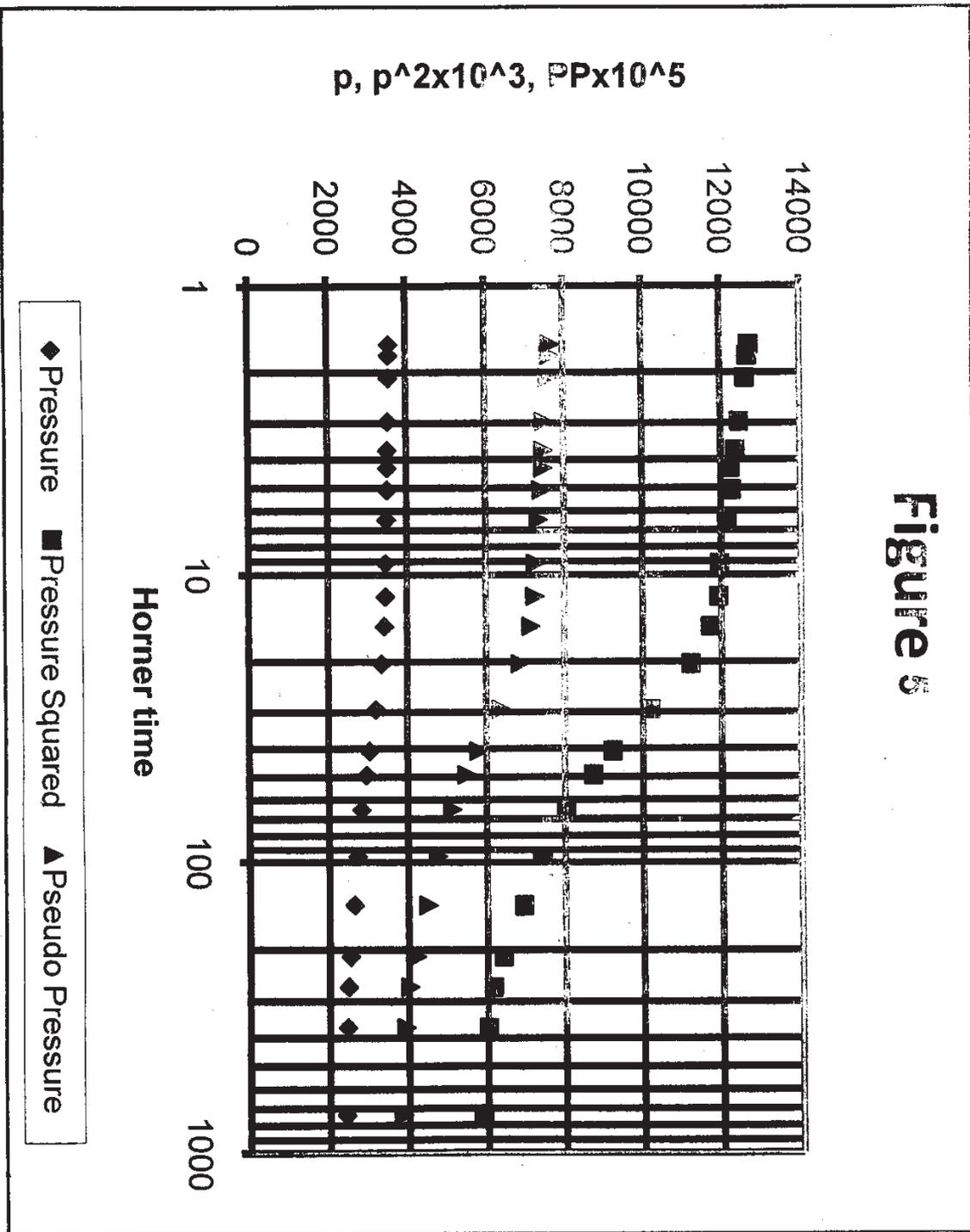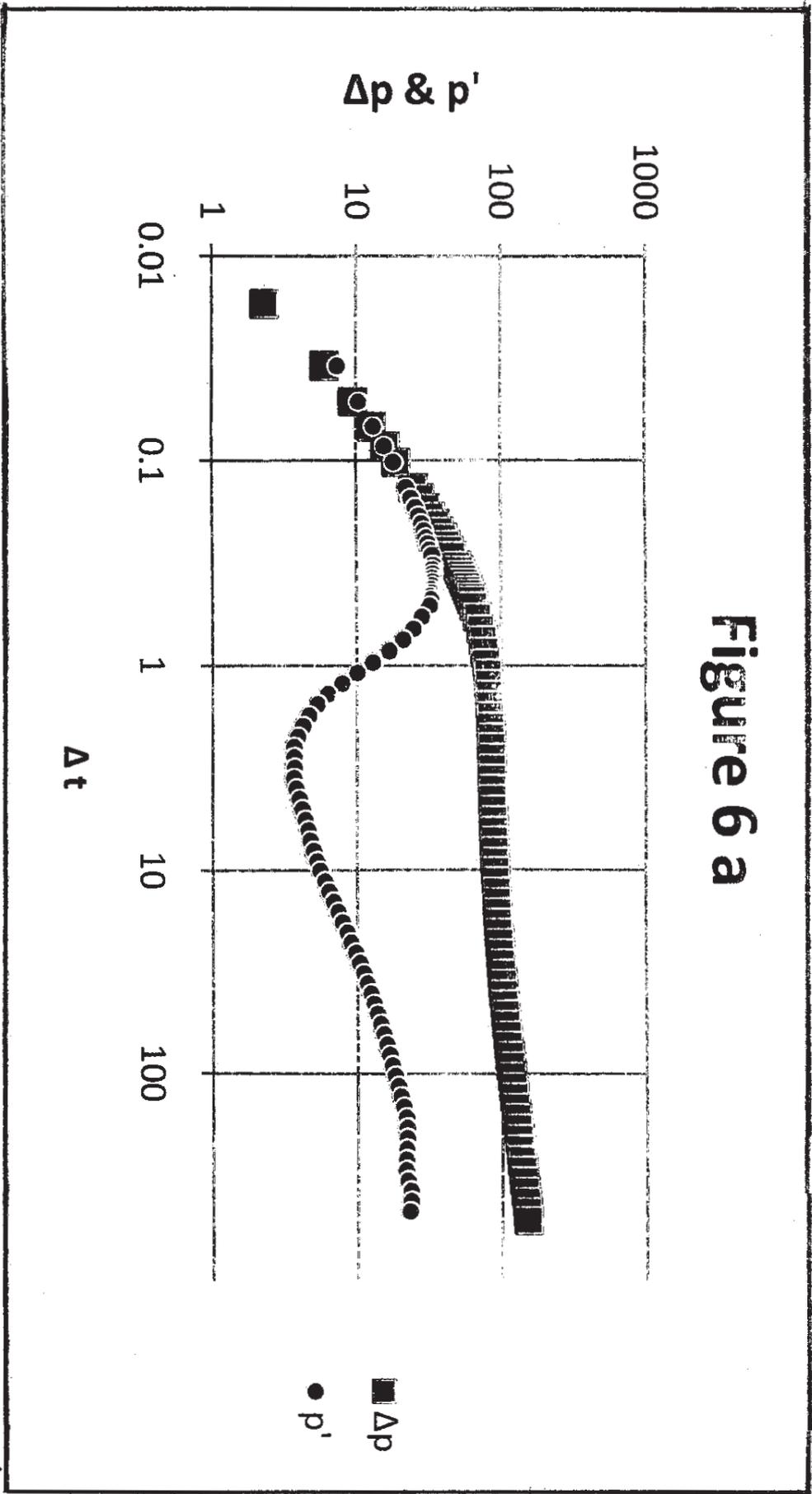
Figure 6 a

Figure 6b: Horner Plot

pws(psia)
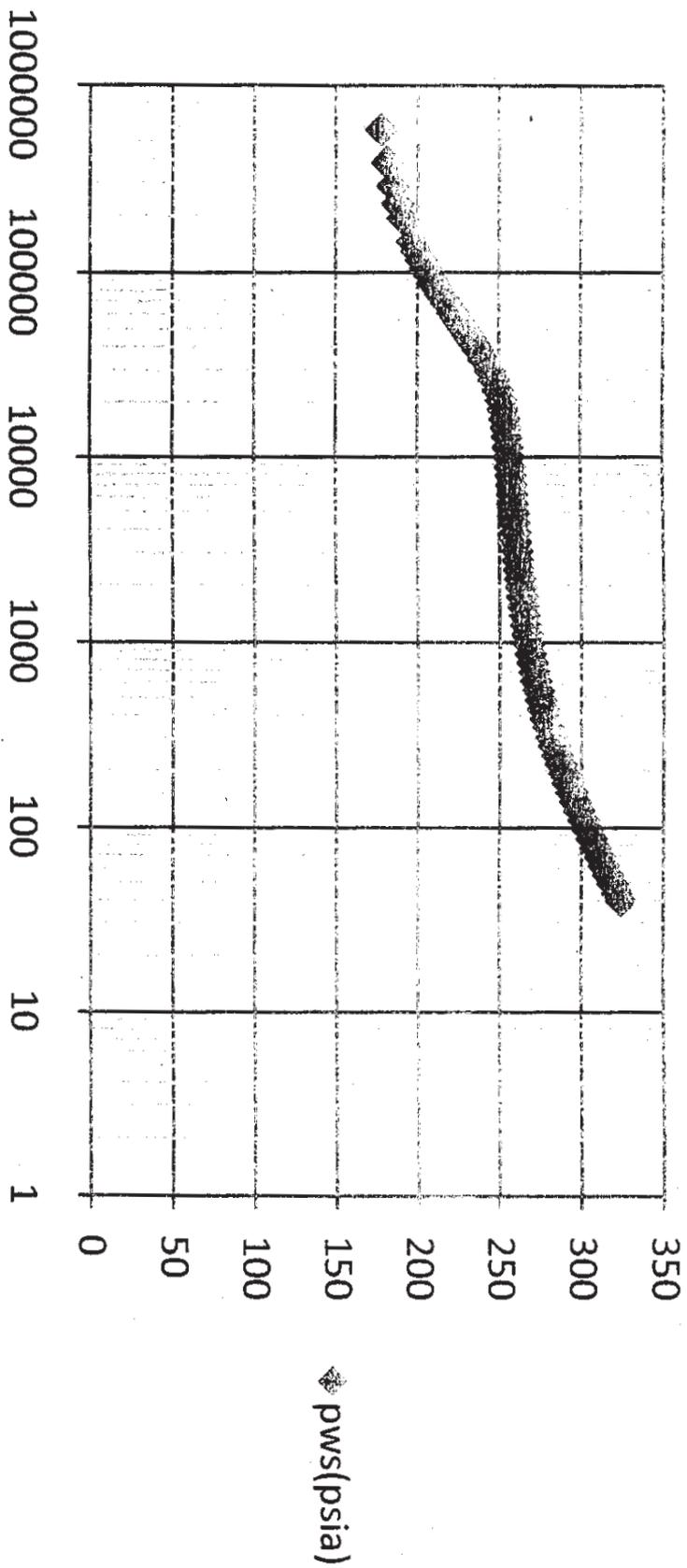
Table 1.2

1. $P = P_i + 70.6 \frac{qB\mu}{kh} Ei\left(-\frac{948\,\phi\mu c_t\, r^2}{kt}\right)$

2. $S = 1.151\left[\frac{P_{1hr} - P_{wf}}{m} - \log\left(\frac{k}{\phi\mu c_t\, r_w^2}\right) + 3.23\right]$

3. $\Delta P_s = 141.2 \frac{qB\mu}{kh}\left(\frac{k}{k_s} - 1\right)\ln\left(\frac{r_s}{r_w}\right) = 0.869\,mS = \left(1 - \frac{k_{wb}}{k_f}\right)\Delta P_d$

4. $r_i = \left(\frac{kt}{948\,\phi\mu c_t}\right)^{1/2}$; $r_{wa} = r_w\, e^{-S}$

5. $J = \frac{0.00708\,kh}{B\mu\left[\frac{1}{2}\ln\left(\frac{10.06\,A}{c_A\, r_w^2} - \frac{3}{4} + S\right)\right]} = \frac{k_J h}{141.2\,B\mu\left[\ln\left(\frac{r_e}{r_w}\right) - \frac{3}{4}\right]}$

6. $\frac{3.79\times10^5\,\phi\mu c_t\, r_w^2}{k}\,(948\, r_e^2)$, $\frac{\phi\mu c_t\, A}{0.000264\,k}$

7. $S = \frac{h_t}{h_p} S_d + S_p$; $S_p = \left(\frac{h_t}{h_p} - 1\right)\left[\ln\left(\frac{h_t}{r_w}\sqrt{\frac{k_H}{k_V}}\right) - 2\right]$

8. $\theta_w' = \tan^{-1}\left(\sqrt{\frac{k_V}{k_H}}\tan\theta_w\right)$; $h_D = \frac{h}{r_w}\sqrt{\frac{k_H}{k_V}}$

9a. $S_\theta = -\left(\frac{\theta_w'}{41}\right)^{2.06} - \left(\frac{\theta_w'}{56}\right)^{1.86}\log\left(\frac{h_D}{100}\right)$

10. $\frac{250\,\phi\mu c_t\, r_e^2}{k}\,(750)$; $V_p = \frac{-0.234\,qB}{c_t}\left(\frac{\partial p_{wf}}{\partial t}\right)$

11. $t_{DA} = \frac{0.00264\,k\,t_p}{\phi\mu c_t\, A}$; $P_{D_{MBH}} = \frac{2.303\,(p^* - \bar{p})}{m}$

12. $\Delta P_{ws}^* = -70.6\frac{qB\mu}{kh}Ei\left(-\frac{3792\,\phi\mu c_t\, L^2}{k\,\Delta t}\right)$; $L = \left(\frac{0.000148\,k\,\Delta t_x}{\phi\mu c_t}\right)^{1/2}$

13. $S = 1.151\left[\frac{P_i - P_{wf}}{q}\Big|_{1hr}\cdot\frac{1}{m'} - \log\left(\frac{k}{\phi\mu c_t\, r_w^2}\right) + 3.23\right]$

14. $\frac{P_i - P_{wf}}{q_n} = 162.6\frac{\mu B}{kh}\left[\sum_{j=1}^{n}\left(\frac{q_j - q_{j-1}}{q_n}\right)\cdot\log\left(t_n - t_{j-1}\right)\right]$
    $+ 162.6\frac{\mu B}{kh}\left[\log\left(\frac{k}{\phi\mu c_t\, r_w^2}\right) - 3.23 + 0.869S\right]$

15. $P_i - P_{ws} = 162.6\frac{q_{n-1}\mu B}{kh}\left[\frac{q_1}{q_{n-1}}\log\left(\frac{t}{t - t_1}\right) + \cdots \log\left(\frac{t - t_{n-2}}{t - t_{n-1}}\right)\right]$

16. $k = \frac{141.2\,qB\mu\,\Delta P_D\,(t_L/\Delta t_c)^2}{h\,\Delta p\,(t_L/\Delta t_c)^2}$; $\phi c_t = \frac{0.000264\,k\,t_L}{\mu r^2\,[(t_L)_D/r_D^2]}$

Table 1.3

Gas, Using Pressure and Time		
	Flow Test	Buildup Test
Semilog graph variables	p_{wf} vs. t	p_{ws} vs. $(t_p + \Delta t)/\Delta t$
Permeability	$k = \dfrac{162.6 q_g \overline{B}_g \overline{\mu}}{mh}$	$k = \dfrac{162.6 q_g \overline{B}_g \overline{\mu}}{mh}$
Skin factor	$s' = 1.151\left[\dfrac{p_i - p_{1hr}}{m} - \log\left(\dfrac{k}{\phi\overline{\mu}c_t r_w^2}\right) + 3.23\right]$	$s' = 1.151\left[\dfrac{p_{1hr} - p_{wf}}{m} - \log\left(\dfrac{k}{\phi\overline{\mu}c_t r_w^2}\right) + 3.23\right]$
Definition of $P_{MBH,D}$	NA	$\dfrac{kh\left(p^* - \overline{p}\right)}{70.6 q_g \overline{B}_g \overline{\mu}}$

Gas, Using Pressure Squared and Time		
	Flow Test	Buildup Test
Semilog graph variables	p^2_{wf} vs. t	p^2_{ws} vs. $(t_p + \Delta t)/\Delta t$
Permeability	$k = \dfrac{1637 q_g T \overline{z}\overline{\mu}}{mh}$	$k = \dfrac{1637 q_g T \overline{z}\overline{\mu}}{mh}$
Skin factor	$s' = 1.151\left[\dfrac{p_i^2 - p_{1hr}^2}{m} - \log\left(\dfrac{k}{\phi\overline{\mu}c_t r_w^2}\right) + 3.23\right]$	$s' = 1.151\left[\dfrac{p_{1hr}^2 - p_{wf}^2}{m} - \log\left(\dfrac{k}{\phi\overline{\mu}c_t r_w^2}\right) + 3.23\right]$
Definition of $P_{MBH,D}$	NA	$\dfrac{kh\left(p^{*2} - \overline{p}^2\right)}{711 q_g T \overline{z}\overline{\mu}}$

Gas, Using Pseudopressure and Time		
	Flow Test	Buildup Test
Semilog graph variables	p_p vs. t	p_p vs. $(t_p + \Delta t)/\Delta t$
Permeability	$k = \dfrac{1637 q_g T}{mh}$	$k = \dfrac{1637 q_g T}{mh}$
Skin factor	$s' = 1.151\left[\dfrac{p_{p,i} - p_{p,1hr}}{m} - \log\left(\dfrac{k}{\phi\overline{\mu}c_t r_w^2}\right) + 3.23\right]$	$s' = 1.151\left[\dfrac{p_{p,1hr} - p_{p,wf}}{m} - \log\left(\dfrac{k}{\phi\overline{\mu}c_t r_w^2}\right) + 3.23\right]$
Definition of $P_{MBH,D}$	NA	$\dfrac{kh\left(p_p^* - \overline{p}_p\right)}{711 q_g T}$

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[4064] - 163

B.E. (Printing)
OFFSET MACHINES - II
(2003 Course) (Sem. - I) (408284)

Time : 3 Hours]   *[Max. Marks :100*

Instructions to the candidates:

1) *All questions are compulsory*
2) *Answers to the two sections should be written in separate books.*

SECTION - I

Q1) Explain the following: **[16]**

 a) What are the different types of reel stands?

 b) Explain use of clamp truck with neat diagram?

OR

Explain the following: **[16]**

Explain with neat diagram working of flying speed splicing mechanism.

Q2) a) Compare fabric backed blanket with metal backed blankets.   **[8]**

 b) Explain high speed dampening systems used in web offset.   **[8]**

OR

Answer the following: **[16]**

 a) Inking unit in web offset.

 b) Plates used in web offset.

 c) Role of oscillators.

 d) Anilox offset inking system.

Q3) Explain evolution of chill roll design.   **[18]**

<p align="center">OR</p>

a) Describe different types of dryers used in web offset.   **[9]**

b) Explain maintenance of former folding mechanisms.   **[9]**

<p align="center">**SECTION - II**</p>

Q4) Explain various factors affecting tension in web on presses.   **[18]**

<p align="center">OR</p>

Explain various tension zones in the web press.   **[18]**

Q5) Explain remote console, sheet cleaner, antistatic devices and chilled water recirculation used on web presses.   **[16]**

<p align="center">OR</p>

Explain the importance of maintenance? How is it useful for news paper industry?   **[16]**

Q6) Explain following troubles: **[16]**

a) Cuts in paper reel.

b) Ink flying in press room.

c) Out of round role.

d) Linting.

<p align="center">OR</p>

Explain the performance of the following substrates in terms of density, dot gain and contrast: **[16]**

a) Newsprint.

b) Super-calendered paper.

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[4064] - 251

P1177

B.E. (Computer)

DESIGN AND ANALYSIS OF ALGORITHMS
(2003 Course) (Sem. - I) (410441)

Time : 3 Hours]   *[Max. Marks :100*

Instructions to the candidates:

     1)   *Answer three questions from each section.*

     2)   *Answers to the two sections should be written in separate answer books.*

     3)   *Figures to the right indicate full marks.*

     4)   *Assume suitable data, if necessary.*

SECTION - I

Q1)   a)   Prove by contradiction that : "There are infinitely many prime numbers". **[6]**

      b)   Prove by mathematical induction that the sum of the cubes of the first n positive integers is equal to the square of the sum of these integers. **[8]**

      c)   State whether the following functions are CORRECT or INCORRECT and justify your answer. **[4]**

        i) $3n + 2 = O(n)$

        ii) $10n^2 + 4n + 2 = O(n^2)$.

<div align="center">OR</div>

Q2)   a)   Define the following : **[6]**

        i)   Big O notation

        ii)   Omega - Ω notations.

        iii) Θ – theta notations.

      b)   Consider the recurrence

           $T(n) = O(n)$

           $T(1) = \Theta(1)$

      Show that above recurrence is asymptotically bound by $\Theta(n)$. **[4]**

      c)   Prove by contradiction: There exist two irrational numbers x and y such that x^y is rational. **[8]**

Q3) a) Write Algorithm for sorting the given n elements using Quick-Sort. State the time complexity of the same. **[8]**

b) Write algorithm to calculate minimum spanning tree in any given Graph G(V, E). **[8]**

OR

Q4) a) Explain the need of divide and conquer strategy. Enlist few applications which can be solved by this strategy. Write a control abstraction for divide and conquer strategy. **[8]**

b) Write Kruskal's algorithm. State its time complexity. **[8]**

Q5) a) Explain dynamic programming approach for finding an optimal tour of the given graph. **[8]**

b) What is 0/1 Knapsack problem? Enlist some of it's applications. **[4]**

c) Define multistage graph. What is a multi-stage graph problem? **[4]**

OR

Q6) a) Give an algorithm/flowchart, to solve traveling sales person problem using dynamic programming. **[8]**

b) Write a short note on worst case optimal algorithm. **[4]**

c) Enlist and briefly explain elements of dynamic programming. **[4]**

SECTION - II

Q7) a) Write an algorithm to solve n queens problem using backtracking method.**[8]**

b) Write a short note on branch and bound method. **[8]**

OR

Q8) a) Write a recursive algorithm which shows a recursive formulation of the backtracking technique. **[8]**

b) Explain how graph coloring problem can be solved using back tracking method. **[8]**

Q9) a) Write an algorithm for pointer doubling problem. What is the time complexity of this algorithm? **[8]**

b) Explain in detail parallel MERGE sorting. **[10]**

Q10) a) Comment on the statement "A parallel algorithm is optimal if it is work efficient with respect to the best possible sequential algorithm". **[6]**

b) Write an algorithm to find the sum of n-elements of a complete binary tree. **[6]**

c) If a comparison network with n inputs sorts all 2^n possible sequences of 0's and 1's correctly then prove that it sorts all sequences of arbitrary numbers correctly. **[6]**

Q11) a) State True or False: Satisfiability problem is NP complete. **[2]**

b) Prove that Hamiltonian cycle is in NP. **[8]**

c) Write Non Deterministic Knapsack algorithm. **[6]**

OR

Q12) Write Short note on any two: **[16]**

a) NP Completeness of a algorithm and NP-Hard problems.

b) Non Deterministic Polynomial Time Decision Problems.

c) AND/OR graph problem.

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P1178

[4064] - 561

B.E. (Petrochemical)

REACTION ENGINEERING - II

(2008 Course) (Sem. - I) (412401)

Time : 3 Hours]   *[Max. Marks :100*

Instructions to the candidates:

  1)   *Answer any three questions from each section.*

  2)   *Answers to the two sections should be written in two separate answer books.*

  3)   *Figures to the right indicate full marks.*

  4)   *Assume suitable data wherever necessary.*

  5)   *Use of steam tables and electronic calculator is allowed.*

SECTION - I

Q1) a) Explain the steps involved in Langmuir-Hinshelwood kinetic mechanism with help of an example. **[6]**

  b) Write reaction statement for Deacon's process which yields chlorine gas from reaction of HCl with oxygen over a copper chloride catalyst. Suggest an appropriate kinetic equation assuming surface reaction to be rate controlling. **[10]**

Q2) a) Define effectiveness factor and Thiele Modulus and show how they are related. Explain the effect of pellet size and speed of surface reaction on effective use of a catalyst pellet. **[6]**

  b) We want to build a packed bed reactor filled with 1.5-cm porous catalyst particles (catalyst density is 2200 kg/m^3 and effective diffusivity is 2.5×10^{-6} m^3/m cat. s) to treat 1m^3/s of feed gas (1/3 A, 1/3 B, 1/3 inert) at 300 C and 5 atm to 90% conversion of A. Experiments with fine catalyst particles which are free from diffusional resistance show that the gas phase reaction $A + B \rightarrow R + S$ is second order with rate constant given as 0.01 m^6/mol.kg.s. How much catalyst must we use? **[12]**

P.T.O.

Q3) a) Calculate external surface area in sq m per gm of 3 micron sized non-porous catalyst. (Assume solid catalyst's Sp. Gr. as 2.5) What size will be needed if the external surface is to be 100 sq m per gm. **[4]**

b) In an experiment to determine pore volume and porosity of a catalyst, following data was obtained. For 102 gm of catalyst sample, volume of helium displaced was 41 cm^3 whereas volume of mercury displaced was 85 cm^3. Calculate solid density, pore volume per gm and porosity of the catalyst. **[6]**

c) Explain in brief BET method for measurement of catalyst surface area. **[6]**

Q4) a) Explain how pore diffusion can falsify kinetic studies at laboratory scale. How will you guard your results from such distortions? **[8]**

b) Give an account of pertinent catalytic reactions, catalysts used and reactors employed in petroleum refining. **[8]**

SECTION – II

Q5) Reaction between gaseous A and liquid B takes place in a mechanically agitated contactor. Assuming that reaction is slow, second order and occurs in bulk liquid, propose a mathematical model for the steady state operation of this reactor. State all your assumptions clearly. Is it analytically solvable for exit concentrations of A and B? If yes, furnish the solution in terms of the other operating parameters. **[16]**

Q6) An acidic impurity A in a gaseous stream is to be removed so as to reduce its partial pressure from 120 Pa to 20 Pa (total pressure is 100 KPa) by reacting it with a base B dissolved in water in a packed tower operated in a counter-current manner. Overall gas side mass transfer coefficient is 0.008 mol/hr.m^3.Pa. Gas side resistance to mass transport in absence of the reaction is 3% whereas the liquid film contributes the remaining 97% resistance. Henry's constant is 12 Pa.m^3/mol. L/G ratio is 6 mol/mol. Calculate minimum concentration of B needed at the top of the tower to ensure minimum height of the tower. Also calculate this minimum height. **[18]**

Q7) a) Derive time-conversion relationship for a spherical particle reacting with a gas in a uniform atmosphere. Assume the diffusion to gas transport through the product layer formed to be controlling the overall rate. **[10]**

b) Spherical particle of ZnS with initial diameter of 1 cm is subjected to roasting in presence of air. Roasting reaction yields SO_2 as also the layer of ZnO. Molar density of solid may be assumed to be 0.043 mol/cm^3.Diffusivity of gas through the product layer is 0.07 cm^2/s. Calculate the time required to reduce the diameter by 95%. **[6]**

Q8) a) Discuss models of catalyst deactivation. **[8]**

b) Define Hatta Number. Discuss its significance in the choice and design of g-L reactors. **[8]**

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[4064] - 166

B.E. (Printing)

FLEXIBLE PACKAGING

(Sem. - I) (2003 Course) (Elective - I) (408281)

Time : 3 Hours]   *[Max. Marks :100*

Instructions to the candidates:

    1)   *Answers to the two sections should be written in separate books.*

    2)   *Neat diagrams must be drawn wherever necessary.*

    3)   *Figures to the right indicate full marks.*

SECTION - I

Q1)   a)   Explain the role of Polyethylene in Packaging.   **[10]**

      b)   Explain the Basic requirements of Packaging.   **[8]**

<div align="center">OR</div>

Write properties and applications of the following:

   a)   BOPP   b)   PET A

   c)   Metallized films   d)   LDPE

Q2)   Explain with neat diagram different types of Dry Lamination Techniques.**[16]**

<div align="center">OR</div>

Write notes on (Any Two):

   a)   Extrusion process

   b)   Heat Seal technique

   c)   Coating

Q3) Explain in detail Retort Packaging for a product. **[16]**

OR

Write notes on (Any Two):

a) Collapsible tubes.

b) Bag-in-Box.

c) Aseptic Packaging

SECTION - II

Q4) Explain in detail wrapping techniques for a product. **[18]**

OR

Explain the importance of closure in a package

Q5) Explain in detail deterioration factors for Beverage products. **[16]**

OR

Mention the packaging technology for the following products.

a) Milk   b) Horticulture products

c) CSD   d) Meat

Q6) Explain in detail Gravure press for Flexible Packaging. **[16]**

OR

Explain in detail Rotary Letter press for Flexible Packaging.

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P1220

[4064] - 412

B.E. (Civil)

EARTHQUAKE ENGINEERING

(Sem. - I) (2008 Course) (Elective - II) (401005 (D))

Time : 3 Hours]   *[Max. Marks :100*

Instructions to the candidates:

1) *Attempt Q.1 or Q.2, Q.3 or Q.4 and Q.5 or Q.6 from section I and Q.7 or Q.8, Q.9 or Q.10 and Q.11 or Q.12 from section II.*

2) *Answers to the two sections must be written in two separate answer books.*

3) *Neat diagrams should be drawn wherever necessary.*

4) *Figures to the right indicate full marks.*

5) *Assume suitable data, if necessary.*

6) *Use of cell phone is prohibited in examination hall.*

7) *Use of electronic non-programmable pocket calculator is permitted.*

8) *Use of IS 1893-2002 (Part-I) & IS 13920 is permitted.*

SECTION - I

Q1) a) What is an earthquake? Explain in details the causes and classification of the earthquake? **[8]**

b) Describe in details the approaches of measurement of Magnitude and Intensity of an earthquake? **[8]**

OR

Q2) a) Classify and describe with suitable sketches the different types of waves generated by an earthquake and their effects on structures. **[8]**

b) Explain in brief some of the earthquakes occurred in India? What lessons are learnt from them? **[8]**

Q3) a) What are types of vibrations? Obtain general solution for Un-damped Forced SDOF system? Hence derive the equation for Dynamic Amplification Factor? **[8]**

b) A vibrating system of SDOF consists of mass of 2kg and a spring of constant 20 kN/cm. The system is viscously damped such that the ratio of any consecutive amplitudes is 1.00 : 0.90. Determine **[8]**

   i)   Natural Frequency   ii)   Logarithmic Decrement

   iii) Damping Factor   iv) Damping Coefficient

<div align="center">OR</div>

Q4) a) Derive the expression for logarithmic decrement 'δ' in terms of damping ratio 'ζ'. **[8]**

b) Obtain natural frequencies of the two storey shear frame having equal floor mass 'm' and stiffness of first storey half the second storey? **[8]**

Q5) a) Explain in details the effect of configuration of the buildings on performance in an earthquake? **[8]**

b) A Three Storey RC frame OMRF building with storey height 3 m and live load 3 N/m^2 is to be constructed in Zone IV: Workout the seismic forces on the structure. The size of the columns are 400 mm × 400 mm on each floor. The exterior and interior beams are 230 mm × 550 mm and 230 mm × 500 mm respectively. The thickness of the roof and floor slab may be assumed 150 mm. The structure is resting on Type III soil and damping ratio 5%. Use Seismic Coefficient Method. Refer Figure 5.1. **[10]**
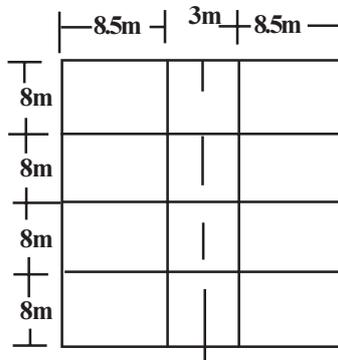
Figure 3.1

<div align="center">QR</div>

Q6) a) Explain the ductility and ductility reduction factor? What is strong column-weak beam philosophy in earthquake resistant design of structures? Draw neat sketches of column-beam joint detailing? **[8]**

b) Design a rectangular RCC beam of 6 m span supported on a RCC column to carry a point of 100 kN load in addition to its own weight. The moment due to seismic force is 5 kN-m and shear force is 32 kN. Use M20 grade concrete and Fe415 steel. **[10]**

SECTION - II

Q7) A 230 mm × 400 mm column is reinforced with 8-12 mm Φ bars. It is supported on an isolated footing subjected to a load of 950 kN and a moment of 25 kN-m. The SBC of the soil is 220 kN/m². Using M20 Grade of concrete and Fe415 steel, design the footing. **[18]**

OR

Q8) a) Explain the response of the structure to earthquake forces. **[8]**

b) Describe the phenomenon of Liquefaction? Explain the measures taken to reduce the effect of liquefaction? **[10]**

Q9) Write notes on following with neat sketches: **[16]**

a) Moment Resisting Frames

b) Structural Walls (Shear Walls)

c) Concentrically Braced Frames

d) Eccentrically Braced Frames

OR

Q10) a) Explain the concept of Isolation and its need? Why the base isolation is effective. **[8]**

b) Explain Active, Passive and Hybrid protective systems of Isolation. **[8]**

Q11) What is Seismic Evaluation? Classify different retrofitting techniques. Explain conventional techniques of retrofitting for RC buildings. **[16]**

OR

Q12) Describe different Non-Destructive Tests used for seismic evaluation of the building along with their limitations. **[16]**

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[4064] - 3

P405

B.E. (Civil)

QUANTITY, SURVEYING, CONTRACTS & TENDERS

(Sem. - I) (2003 Course) (401003)

Time : 4 Hours]   *[Max. Marks :100*

Instructions to the candidates:

1) *Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, questions from section I & answer Q.7 or Q.8, Q.9 or Q.10, Q.11 or Q.12 questions from section II.*

2) *Answers to the two sections should be written in separate books.*

3) *Figures to the right indicate full marks.*

4) *Neat diagrams must be drawn wherever necessary.*

5) *Use of logarithmic tables, slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.*

6) *Assume suitable data, if necessary.*

SECTION - I

Q1) a) Distinguish between an estimate and estimation. Explain – approximate estimate, detailed estimate, supplementary estimate and revised estimate with an example each. **[10]**

b) Explain all the rules associated with deductions additions for the plaster item as per IS 1200. **[8]**

OR

Q2) a) Explain the logic behind deciding the units of measurement, with suitable examples. **[10]**

   i) m^3 ii) m^2

   iii) m   iv)   Rg

   v)   No

b) Explain all the rules as per IS 1200 associated with measurement of RCC items without steel reinforcement, for **[8]**

   i)   Columns

   ii)   Beams

   iii) Slabs, with suitable examples

Q3) A dog - legged stair consists of 10 steps in each flight of width 300 mm. Length of step is 1.5m and rise is 150 mm. Width of landing is 2.0 m. Waist slab thickness is 200 mm. The steel reinforcement consists of

– Longitudinal steel – 12mm ϕ ToR at 200mmC – C and

– Transverse steel – 10mm ϕ ToR at 250mmC – C.

Determine:-

a) Quantities for RCC(1:1½:3) items as per IS 1200 & DSR requirements. **[3]**

b) % of steel in staircase. **[5]**

c) Bill of materials required to execute the above work. (3% wastage, 5% safety stock may be considered). **[5]**

d) Draw bar-bending schedule. **[3]**

OR

Q4) A masonary wall of 300 mm thickness is to be constructed with IS bricks in C.M, 1:6. Sieved Sand is to be used for the masonary joints. The dimensions of the wall are 5m × 4m. The wall has the following openings :-

Window – W_1 – 1.5m × 1.2m

Door – D_1 – 1.2m × 2.1 m

Assume suitable sizes for lintels, chajjas. Determine

a) Item quantity for BB masonary in C.M, 1:6 as per IS 1200. **[3]**

b) Item quantity for R.C.C. Lintel. **[2]**

c) Item quantity for R.C.C. Chajja **[2]**

d) Bill of materials required to execute the entire above work. (3% wastege, 5% safety stock may be considered) **[9]**

Assume mix for RCC as M(25).

Q5) a) Draft a detailed specification for providing and laying RCC of M(25) grade including formwork and including steel reinforcement for a slab, with all other standard requirements which are normally specified in the BOQ. **[12]**

b) Discuss the various factors affecting the rate of any item. **[4]**

OR

Q6) a) Explain various types of specifications such as brief, detailed, standard, open, closed with examples. Elaborate the do's and dont's w.r.t specification writing. Discuss the importance of specifications from the legal as well as the construction point of view. **[12]**

b) What is Taskwork? Why does it vary? Explain its importance with an example. **[4]**

SECTION - II

Q7) a) Explain any 5 factors affecting value of a property in brief, with suitable examples. **[10]**

b) Determine value of property based on following information: **[8]**

i) Plot Area 2000 m^2

ii) Land Rate when purchased in year 2000 – Rs 1000 per m^2.

iii) Appreciation of Land rate – 4% per annum at a compounded worth.

iv) Year of valuation – 2011.

v) F S I consumed – 0.5.

vi) Construction cost in the year 2005 when building was constructed is – Rs 8000/- per sq.m.

vii) Interest rate on sinking fund – 5%

viii) Expected life of building – 50 years Use Present Land Value method.

OR

Q8) a) Explain with examples, any 5 types of value. **[5]**

b) Explain any 2 methods of working out depreciation, in brief. **[6]**

c) Explain "method of yield", with an example. **[5]**

d) Explain concept of Land reversion and reversionary value. **[2]**

Q9) a) Draft a brief tender notice, so as to construct a multistoreyed mall building of 50 crores to be completed in 18 calendar months, involving pre-qualifications of tenderers. **[7]**

b) Explain process of administrative approval and technical sanction in the PWD with an example. **[5]**

c) Explain the purpose of taking the Security Deposit in a tender. **[4]**

Q10) a) Discuss merits, demerits of Open Tenders as against Negotiated Tender. **[6]**

b) How cartel formation in a tender can be detected? What action is then subsequently taken? **[4]**

c) Before working out a tender and before submitting it, what information and data needs to be collected and ascertained Elaborate. **[6]**

Q11) a) Explain valid, voidable, and void contracts with an example each. Discuss essential requirements as per ICA (1872) for forming a valid contract. **[8]**

b) In the recent Japanase earthquake scenario, a major on-going construction work got devasted. You were the contractor of that work. Which conditions in the contract will enable you to recover the losses incurred? Explain with reasoning. **[8]**

<div align="center">OR</div>

Q12) a) On a construction work, the following defects are noticed.

i) Door shutters are not fitting in the door frames because of faulty line, level and dimensioning.

ii) Toilet slabs are leaking after water proofing is done.

iii) Non-uniformity in the paint colour shades is observed.

iv) Shrinkage cracks in plaster item are observed, before painting.

As an Engineer in charge of the works, what action you will take against the contractor, in accordance with the contract conditions? Explain for each defect, separately. **[12]**

b) Explain B.T.O contract with an example. **[4]**

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[4064] - 4

P406

B.E. (Civil)

STRUCTURAL DESIGN - III

(2003 Course) (401004) (Sem. - I)

Time : 4 Hours]   *[Max. Marks :100*

Instructions to the candidates:

1) *Answer Q.1 or Q.2, Q.3 or Q.4 in section-I*
2) *Answer Q.5 or Q.6, Q.7 or Q.8 in section-II.*
3) *Answers to the two sections should be written in separate books.*
4) *Figures to the right indicate full marks.*
5) *Use of IS 1343, IS 456, IS 3370 & non programmable calculator is allowed.*
6) *Neat diagrams must be drawn wherever necessary.*
7) *Assume any other data if necessary & mention it at the starting of the answer.*
8) *Mere reproduction from IS Code as answer, will not be given full credit.*
9) *Assume any other data if required.*

SECTION - I

Q1) a) Explain in brief   **[8]**
  i)   Single degree freedom system
  ii)   Critical damping

  b) A post tensioned prestressed concrete beam section has top flange
  650×150, web 150×600 and bottom flange 350×300 mm, is simply
  supported over a effective span of 17 m and carries a super imposed
  load of 13 kN/m over entire span. Calculate extreme fiber stresses in
  concrete at midspan at initial and final stage. The 7 No. of 12/7 Freyssinet
  cables having zero eccentricity at supports and c.g. area of steel at 100
  mm from soffit of the section and are stressed to initial prestress of 1000
  Mpa. Take loss ratio as 0.85 and unit weight concrete as 25 kN/m^3. **[17]**

OR

Q2) a) A mild steel plate of cross section 12 mm $\times$ 50 mm ,of length 0.8 m is
  supporting a load of 150 N through a spring having stiffness K = 100 N/mm
  as shown in fig (1). Calculate the natural frequency of the system if modulus
  of elasticity of mild steel is 200 Gpa.   **[8]**
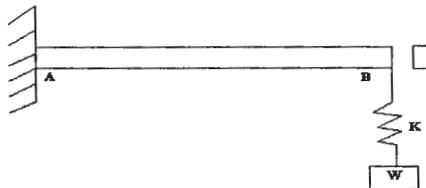
Fig(1)

P.T.O.

b) A post tensioned prestressed concrete beam section has top flange 500 × 150, web 125 × 600 and bottom flange 300 × 200 mm, is simply supported over a effective span of 16 m . The beam is prestressed with 5 No. of 12/5 Freyssinet parabolic cables with their c.g. at 100 mm from extreme bottom fiber, stressed one at a time from only one end. Calculate total loss of prestress at the age of 120 days, if initial prestress is 1030 Mpa, coefficient friction = 0.28, k = 0.0026/m length of cable, slip of anchorage = 2mm, Cc = 2.0, Es = 2 × 10⁵ Mpa, concrete grade = M40, Creep and relaxation of steel = 2% of initial prestress. **[17]**

Q3) Design a post tensioned prestressed concrete rectangular or 'I' section beam for flexure to carry a live load of 12 kN/m over entire simply supported span of 15 m with M40 grade of concrete and Freyssinet cables of 12/5 (fy =1750 Mpa) or 12/7 (fy =1500 Mpa), including the design of end block. Draw sketches showing cable profiles and end block reinforcement details. Check fiber stresses in concrete and deflection **[25]**

OR

Q4) **a)** State remedial measures to be taken to reduce the friction loss in continuous PSC beams. **[8]**

b) A post tensioned prestressed concrete continuous beam ABC with cross section 300 × 800 mm as shown in fig (2)is prestressed with initial prestressing force of 1500 kN . The loads shown are exclusive of dead load. Locate centerline of thrust under prestress plus dead load also & make it concordant stating the shift of cable at salient points find the stresses in concrete at extreme fibers at intermediate support Take loss ratio of 0.85, AD = DB = BE = EC = 8m. The eccentricities at A & C = 0, at D & E = 240 mm (downwards), at B = 150mm (upwards). **[17]**
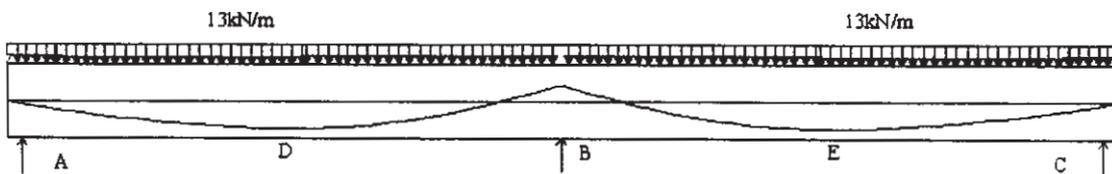
Fig(2)

SECTION - II

Q5) a) Write detailed note on seismic coefficient method. **[8]**

b) Analyze a rigid jointed frame shown in fig (3) by cantilever method for lateral loads. Flexural rigidity for all members is same. Analyze beam GHI using proper substitute frame, if it is subjected to vertical ultimate live & dead load incl. of its self wt. intensities of 13 kN/m & 15kN/m on GH and 16kN/m& 18kN/m on HI respectively. Calculate max. span moment for span HI and support moment at H. Design section for combined effect of vertical and horizontal Loads. Adopt 15% redistribution of moments for vertical load moments Use M20, Fe415.
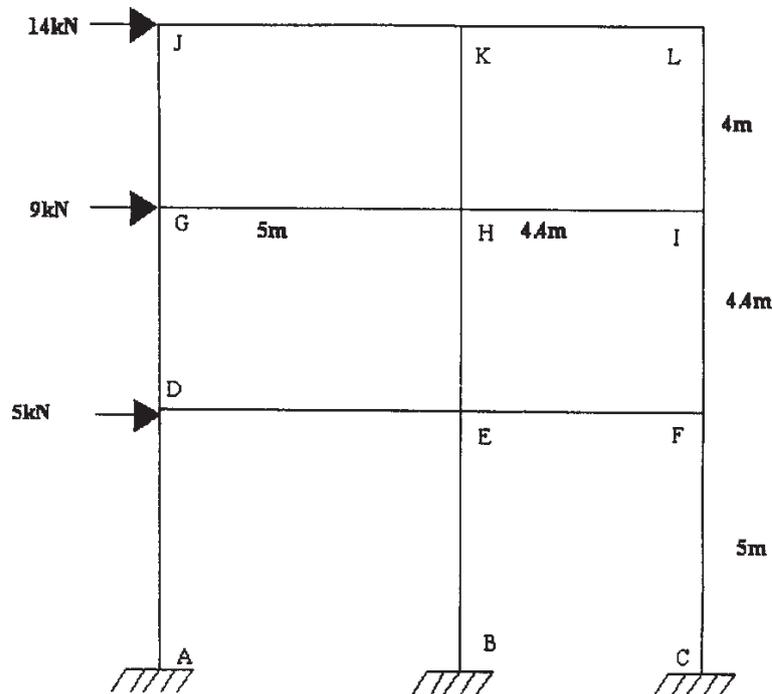
[17]

Fig(3)

OR

Q6) a) Write detailed note on substitute frame method. **[8]**

b) Analyze a rigid jointed frame shown in fig (4) by portal method for lateral loads. Flexural rigidity for all members is same. Analyze beam GHI using proper substitute frame, if it is subjected to vertical ultimate live & dead load incl. of its self wt. Intensities of 22kN/m& 20kN/m on GH and 16kN/m& 15kN/m on HI respectively. Calculate max. span moment for span HI and support moment at H. Design section for combined effect of vertical and horizontal Loads. Adopt 10% redistribution of moments for vertical load moments Use M20, Fe500. **[17]**
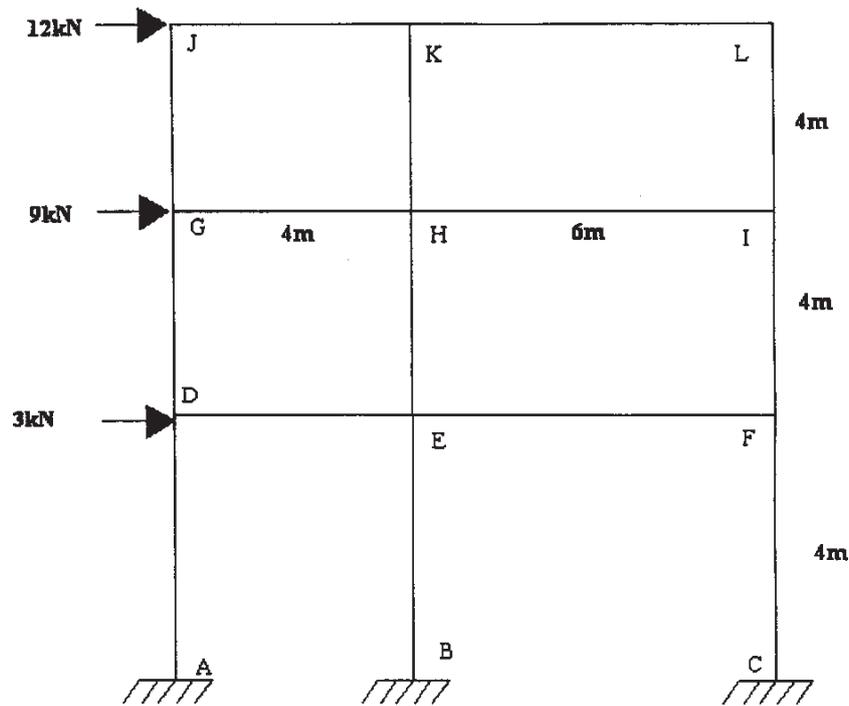
Fig(4)

Q7) a) Compare rectangular combined footings with strap beam to that without it. **[5]**

b) Design circular reinforced concrete tank resting on ground to store 3.25 lakh liters of water the top of tank is open Take the safe bearing capacity of the supporting strata as 180 kN/m². Design the wall and bottom slab of the tank using IS code. Draw all details of reinforcements. **[20]**

OR

Q8) Design a 'L' shaped retaining wall for two layered leveled backfill for the following data

Upper layer, height = 3m, φ = 30°, γ = 18 kN/m³

Lower layer, height = 3m, φ = 32°, γ = 19 kN/m³

Safe bearing capacity of the underlying strata = 150 kN/m² , The coefficient friction between the base slab and the underlying strata = 0.52. Draw lateral pressure diagram and details of reinforcement of stem and base showing curtailment if any. **[25]**

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[4064] - 7

B.E. (Civil)

FINITE ELEMENT METHOD

(2003 Course) (401005) (Elective - I) (Sem. - I)

Time : 3 Hours]   *[Max. Marks :100*

Instructions to the candidates:

1) *Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6 from section I and Q.7 or Q. 8, Q.9 or Q.10, Q.11 or Q.12 from section II.*

2) *Answers to the two sections should be written in separate books.*

3) *Neat diagrams must be drawn wherever necessary.*

4) *Figures to the right indicate full marks.*

5) *Use of electronic pocket calculator is allowed.*

6) *Assume suitable data, if necessary.*

SECTION - I

Q1) a) Write step by step procedure in getting nodal displacements of any type of skeletol structure using finite element method. Take a proper example & draw neat sketch. **[13]**

b) Explain stiffeners coefficient "K_{ij}". Take an example of truss element. **[5]**

OR

Q2) Explain difference between member approach & structure approach in case of beam analysis. How member end actions in beam element are arrived using nodal displacement unknowns. **[18]**

Q3) A portal frame ABCD is fixed at A & D. Columns AB & CD both are 6 m in height & beam BC is 8 m long. It is subjected to horizontal force of 40kN at B in direction BC. Analyse the frame by using structure approach EI is uniform. **[16]**

OR

Q4) Develop from fish principles transformation matrix [T] in case of portal frame element & derive relation between local & global stiffeners matrices.

[16]

Q5) Derive stiffeners matrix for grid element using direct approach. **[16]**

OR

Q6) Explain principle of minimum potential energy by taking suitable example. Derive any one equation for truss element relating nodal force & nodal displacements using principle of minimum potential energy. **[16]**

SECTION - II

Q7) Distinguish between CST & LST elements used for plane elasticity problem. Explain various matrices involved in formulation of [K] for each element. **[16]**

OR

Q8) Using area coordinates derive shape functions for CST element. Explain characteristics of shape functions & verify. **[16]**

Q9) In case of rectangular four noded element using proper displacement polynomial obtain strain displacement matrix the element is used for plane stress condition. **[16]**

OR

Q10) What do you mean by isoparametric element? Taking eight noded serendipity element in quadrilateral form, derive shape functions for any one corner node & any one midside node of element. **[16]**

Q11) Using isoparametric hyxahydron element, write strain displacement & stress strain relations in case of 3D application. Write shape function for any one node using natural coordinates. **[18]**

OR

Q12) Explain axisymmetric problems. Using displacement polynomial for ring element of triangular cross section, obtain [B] matrix. State stress strain relation to obtain [D] matrix. **[18]**

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[4064] - 21

P413

B.E. (Mechanical)
MECHANICAL SYSTEM DESIGN
(Sem. - I) (2003 Course) (402041)

Time : 4 Hours]   *[Max. Marks :100*

Instructions to the candidates:
   1)   Answer three questions from section I and three questions from section II.
   2)   Answers to the two sections should be written in separate books.
   3)   Neat diagrams must be drawn wherever necessary.
   4)   Use of logarithmic tables, slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.
   5)   Assume suitable data, if necessary.

SECTION - I

Q1) a)   Draw stress distribution in a compound cylinder and explain how it helps to increase the pressure capacity of a cylinder of same total thickness.

[6]

   b)   A cylindrical shell has an internal diameter of 2.5m and is made of plain carbon steel with yield strength of 200 MPa. Double welded bult joints which are spot radiographed are used to fabricate the shell. Torispherical heads with a crown radius of 2m knuckle radius of 120mm are used as end closures. Operating pressure inside the shell is 0.75 MPa. Corrosion allowance is 3mm. Determine the thickness of cylindrical shell and torispherical head. **[12]**

OR

Q2) a)   State different theories of failure used in the design of thick cylinders subjected to internal pressure and their applicability under different situations. **[6]**

   b)   An air receiver consists of a cylindrical portion of 2 meter length and 1 meter diameter . It is closed by hemispherical ends. The pressure is not to exceed 2 MPa. If the material is steel having yield point 250 MPa and if the factor of safety is 3.5, calculate the required wall thickness & head thickness. Joint efficiency is 0.8 for shell & 0.9 for head. Also find storage capacity. **[6]**

   c)   Explain various types of supports used in case of horizontal pressure vessels. **[6]**

Q3) a) Explain Johnson's method of optimum design. **[6]**

b) Design a tensile bar of length 200 mm to carry a tensile load of 5 kN for minimum cost out of the following materials. **[10]**

Material	ρ kg/m³	cost (Rs/N)	yield strength(MPa)
Steel	7500	16	130
Al. alloy	3000	32	50
Ti. alloy	4800	480	90
Mg alloy	2100	32	20

OR

Q4) a) Prove that optimisation in power transmitted by a spur gear pair occurs when the tangential force is equal to the dynamic load when the criterion for failure is scoring. Assume dynamic load is directly proportional to pinion speed. **[6]**

b) Prove that for a given helical spring, minimum weight for given conditions occurs when the spring is so designed that the maximum load on it is equal to twice the initial load. **[10]**

Q5) a) Derive the equation for tensile stress in a flywheel rim neglecting the effect of spokes. **[6]**

b) The turning moment diagram for a petrol engine is drawn to the following scales. **[10]**

Turning moment, 1 mm = 5 Nm.

Crank angle, 1 mm = 1°

The turning moment diagram repeats itself after every half revolution of the engine and the areas above and below the mean turning moment line, taken in order are,

$$+ 305, - 695, + 70, - 370, + 990, - 300 \text{ (mm}^2).$$

Determine the mass of 300 mm diameter - flywheel rim when the coefficient of fluctuation of speed is 0.2% and the engine runs at 1800 rpm. Also determine the cross section of the rim when the width of the rim is twice its thickness. Assume the density of the rim (f4 300) as 7250 kg/m³. Also calculate the stresses in the rim, by centrifugal forces.

OR

Q6) a) Derive the expression for the stresses induced in the flywheel arms. **[6]**

b) The turning moments of an engine and load on it are **[10]**

$$T_E = 10000 + 5000 \text{ Sin } 2\theta \text{ (Nm)}$$

$$T_L = 10000 + 5000 \text{ Cos } 2\theta \text{ (Nm)}$$

Where θ is angle turned by the shaft from datum. find out the dimensions of rim for following data

i) Maximum & minimum fluctration of speed during working cycle is from 245 rpm to 235 rpm.

ii) $\rho = 7200 \text{ kg/m}^3$.

iii) Inertial of rim is 90% of total inertia.

iv) Rim width to thickness ratio = 1.6.

v) Radius of flywheel is 1 m.

SECTION - II

Q7) a) The tensile strength of 1000 bolts are normally distributed with a mean of 620 MPa and having a standard deviation of 70 MPa. Calculate. **[8]**

i) How many bolts will have strength less than 540 MPa.

ii) How many are expected to have a strength of between 540MPa & 820 MPa.

Area from 0 to z is as given

Z	1	1.2	1.4	2.0	2.2	2.4	2.8	3.0
A	0.3413	0.3849	0.4192	0.4772	0.4861	0.4918	0.4974	0.4987

b) Explain recommended section changes with the help of diagrams. **[5]**

c) Explain design recommedations for Qualitative displays **[5]**

OR

Q8) a) Explain design recommedations for Quantitative displays. **[5]**

b) Explain design principles in powder metallurgy. **[5]**

c) A shaft is subjected to a maximum load of 10 kN. The shaft is designed to withstand a load of 15 kN. If the maximum load encountered is normally distributed with a standard deviation of 2.5kN. and if the shaft strength is normally distributed with a standard deviation of 2 kN, what failure percentage would be expected? The area under normal curve from 0 to Z is as follows. **[8]**

Z	1.2	1.4	1.6	1.8	2.0
A	0.3849	0.4192	0.4452	0.4641	0.4772

Q9) a) State different types of progressions used in machine tool gearbox design. Discuss the advantages & disadvantages of the same **[6]**

b) Establish the structure equations for a 4 speed gearbox and draw the structural diagrams & gearbox layout. **[10]**

OR

Q10) a) Draw the ray & speed diagram for a six speed gearbox. State the necessary assumption take. Also draw the gearbox layout. **[10]**

b) Derive the equation for difference between the number of teeth of successive gears in a change gearbox. **[6]**

Q11) a) State & explain the requirements of the belt used in a conveyor system. **[4]**

b) An inclined belt conveyor is used for transporting ash over a distance of 1.2 km and height of 500 meters. The material density is 0.5 t/m³. Belt speed is 1.5 m/s & width is 400 mm. Determine the capacity of conveyor. Use following data for flowability factor. **[8]**

Conveyor lnclination	10 -15	16 - 20	21 - 25	26 - 30
Flowability factor	2.65×10^{-4}	2.5×10^{-4}	2.35×10^{-4}	2.2×10^{-4}

c) State advantages of belt conveyor over other conveyors. **[4]**

OR

Q12) a) Draw different belt conveyor layouts. **[4]**

b) Draw & explain screw take up arrangement in belt conveyors. **[6]**

c) Derive the expression for frictional force between the idler & idler roller pin for carrying idler. **[6]**

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[4064] - 24

B.E. (Mechanical Engineering)
GAS TURBINES AND JET PROPULSION
(2003 Course) (402044) (Sem. - I)

Time : 3 Hours]   *[Max. Marks :100*

Instructions to the candidates:

1) *Answer three questions from section I and three questions from section II.*
2) *Answers to the two sections should be written in separate books.*
3) *Neat diagrams must be drawn wherever necessary.*
4) *Figures to the right indicate full marks.*
5) *Use of logarithmic tables, slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.*

SECTION - I
Unit - I

Q1) a) Explain with sketches the operation of converging - diverging nozzle under varying pressure ratios.   **[8]**

b) How do you decide the shape of the nozzle? Explain. Derive relation in this regard?   **[8]**

OR

Q2) a) How the shock waves are formed? What is the normal shock?   **[8]**

b) Derive the Rankine - Hugoniot equation $V_1V_2 = a^{*2}$ with usual notations, for normal shock   **[8]**

Unit - II

Q3) a) Explain the actual working of centrifugal compressor with the help of T-S diagram and write an expression for total - to - total efficiency. **[4]**

b) What is slip and slip factor in case of centrifugal compressors. How it is caused? Explain.   **[4]**

c) What is degree of reaction in centrifugal compressor? Derive the relation for degree of reaction in terms of angles made with respect to the flow directions.   **[8]**

Q4) Write short notes on: **[16]**

    a) Centrifugal and axial compressors

    b) Materials used in compressors.

    c) Surging and stalling in compressors.

    d) Surging and choking

Unit - III

Q5) a) A regenerative reheat cycle has air entering at 1 bar, 300k into compressor having inter cooling in between two stages of compression. Air leaving first stage of compression is cooled to 290k at 4 bar pressure in intercooler and subsequently compressed upto 8 bar. Compressed air leaving second stage of compressor is passed through a regenerator having effectiveness of 0.8. The subsequent combustion chamber yields 1300k at inlet to turbine having expansion upto 4 bar and then reheated upto 1300k before being expanded upto 1 bar. Exhaust from the turbine is passed through regenerator before discharged out of cycle. For the fuel having heating value of 42000 kJ/kg, determine fuel air ratio in each combustion chamber, total turbine work and thermal efficiency. Consider compression and expansion to be isentropic and air as working fluid throughout the cycle. **[12]**

    b) Compare gas turbines with sterm turbines and I.C. Engines. **[6]**

<p align="center">OR</p>

Q6) a) In a gas turbine installation the exhaust of gas turbine is sent for process heating at 200 kPa. Turbine produces power just sufficient to drive the compressor. Turbine inlet temperature is 815ºC, air is supplied to compressor at 1 bar and 17ºC. Determine the compressor pressure ratio for air as working fluid through out. **[12]**

    b) In a gas turbine plant, air is compressed from pressure P_1 and temperature T_1 with a pressure ratio of r_p. The air is heated to a maximum temperature T_{max} and expanded in a two - stage turbine with equal pressure drop in stages. The air expanding from HP stage is re-heated to the temperature T_{max} and then it expands to the initial pressure P_1. Assuming isentropic expansion and compression show that, for maximum possible output possible **[6]**

$$A = B^{2/3} \text{ where } A = \frac{\gamma - 1}{r_p^r} \text{ and } B = \frac{T_{max}}{T_{min}}$$

SECTION - II

Unit - IV

Q7) a) Derive the relation for the degree of reaction R, in case of a reaction turbine. **[6]**

b) The blade speed of an axial flow turbines is 300 m/s. The mass flow rate is 5 kg/s. The gas temperatures at turbine inlet and outlet are 500°C and 300°C respectively. The fixed blade outlet angle is 70° and axial velocity remains constant at 200 m/s. Determine the power developed, degree of reaction and blade efficiency. **[12]**

OR

Q8) a) What is compounding of impulse gas turbines? What are the methods of compounding of turbines? Explain any one method used. **[10]**

b) Explain the terms "loading coefficient" and "flow coefficient" employed in the study of gas turbines. Prove that

$\psi = \phi \, (\tan \alpha_1 + \tan \alpha_2) = \phi \, (\tan\beta_1 + \tan \beta_2)$ with usual notations. **[8]**

Unit - V

Q9) a) What are the desirable requirements for efficient combustion chamber? Explain. **[8]**

b) What are the different types of combustion chambers used in gas turbines? Explain. **[8]**

OR

Q10) Write short notes on **[16]**

a) Fuels used in gas turbines

b) Compustion chamber performance

c) Pollution form gas turbines.

d) Flame tube cooling.

Unit - VI

Q11) a) Explain with a neat sketch working of turbo jet system.   **[6]**

   b) Derive the expression for thrust, thrust power, propulsive efficiency and overall efficiency in case of turbo jet engines.   **[6]**

   c) Classify jet propulsion systems.   **[4]**

OR

Q12) Write short notes on: **[16]**

   a) Thrust augmentation in turbo - jet engines.

   b) Rocket propulsion system and turbojet propulsion system.

   c) Scram jet

   d) Rocket propellants.

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[4064] - 28

B.E. (Mechanical)

KINEMATIC ANALYSIS AND SYNTHESIS

(2003 Course) (402045) (Elective - I) (Sem. - I)

Time : 3 Hours]   *[Max. Marks :100*

Instructions to the candidates:

   1)   *Answer three questions from section I and three questions from section II.*

   2)   *Answers to the two sections should be written in separate books.*

   3)   *Neat diagrams must be drawn wherever necessary.*

   4)   *Figures to the right indicate full marks.*

   5)   *Use of electronic pocket non-programmable calculator is allowed.*

   6)   *Assume suitable data, if necessary.*

SECTION - I

Q1) a) Explain Grubbler criterian for spatial Mechanism & reduce the form to apply for planar mechanism. **[8]**

    b) Explain transmission angle in the mechanism with example. **[8]**

OR

Q2) a) Explain equivalent mechanism with suitable examples. **[8]**

    b) Explain various types of linkages & mechanism for different practical applications. **[8]**

Q3) a) Explain with neat sketches how the auxiliary point method can be applied to a mechanism with low degree of complexity by taking an example. Can the auxiliary point method be also applied to kinematically simple mechanism? comment. **[8]**

    b) Explain rotational & translation displacement. **[8]**

OR

Q4) a) Explain computer aided kinematic analysis. **[6]**

b) In a four link mechanism, the dimensions of the link are as under. **[10]**
AB = 50 mm, BC = 66 mm, CD = 56 mm, & AD = 100 mm AD is a fixed link. At an instant when $\angle DAC = 60°$, the angular velocity of the input link AB is 10.5 rad/sec. in the counter clockwise direction with an angular retardation of 26 rad/sec². Determine analytically the angular displacement, angular velocities & angular acceleration of the output link DC & the coupler BC.

Q5) a) Write a note on Ball's point & its use in Dwell linkage synthesis. **[6]**

b) A four bar mechanism A_0ABB_0 has following dimension: $A_0B_0 = 60mm$, $A_0A = BB_0 = 40mm$. Draw the inflection circle for the configuration in which the input A_0A is in-line with the frameA_0B_0, A being in between A_0 & B_0. **[12]**

OR

Q6) a) Explain the Hartmann construction with a neat sketch and show that it satisfies the Euler - Savary equation. **[9]**

b) A slider crank with zero offset has crank = 2 cm, connecting rod = 6 cm. Crank makes 30° with the IDC. Use Bobillier's construction to draw the inflection circle. Then find the radius of currature of the mid point of the connecting rod. **[9]**

SECTION - II

Q7) Synthesize a 4 bar function generator to generate the function y = 1/x in the interval $1 \le x \le 3$. Using pole method. Take starting position of input link 30°, range of motion for input link $\Delta \phi = 90°$ & range of motion for output link $\Delta \psi = 90°$ both input & output link rotates in counter clockwise direction. Use three accuracy points with chebychev Spacing. **[16]**

OR

Q8) a) Write note on [Any Two] **[8]**

   i) Type, number and Dimensional synthesis.

   ii) Branch and Order defect.

   iii) Types of errors in kinematic synthesis.

b) Describe a graphical method to synthesize a slider crank mechanism when two sucessive rotations ϕ_{12} & ϕ_{23} of the crank are to be coordinated with two sucessive linear displacements S_{12} and S_{23} of the slider. **[8]**

Q9) a) Determine the link lengths of a 4 bar linkage that satisfies following specifications in one of its positions. **[10]**

$\theta_2 = 60°$ $\omega_2 = 5$ rad/sec $\alpha_2 = 2$ rad/s²

$\theta_4 = 90°$ $\omega_4 = 10$ rad/sec $\alpha_4 = 7$ rad/s²

The subscripts 2 & 4 represents the input link and the output link respectively. The length of the input link is to be unity.

b) State and prove Robert - chebycher theorem. **[6]**

<div align="center">OR</div>

Q10) a) Synthesize a four bar linkage that will satisfy the following data for angular velocities and accelerations in one of its position, using complex number method. **[10]**

$$\omega_2 = 20 \text{ rad/sec} \qquad \alpha_2 = 0$$
$$\omega_3 = 8 \text{ rad/sec} \qquad \alpha_3 = 100 \text{ rad/sec}^2$$
$$\omega_4 = 10 \text{ rad/sec} \qquad \alpha_4 = -150 \text{ rad/sec}^2$$

b) Obtain an expression for coupler point curve for a four bar linkage. **[6]**

Q11) a) Discuss the concept of Denavit - Hartenberg parameters and their use in the study of spatial mechanisms. **[8]**

b) Explain Transformation matrix method of displacement analysis of spatial mechanisms. Obtain displacement relationship for Hooke's Joint. **[10]**

<div align="center">OR</div>

Q12) a) Write a note on – Eulerian Angles. **[9]**

b) Obtain the expression for the transformation matrix relating two cartesian frames which are translated and rotated with respect to each other. **[9]**

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P420

[4064] - 29

B.E. (Mechanical)

OPERATIONS RESEARCH

(Sem. - I) (2003 Course) (402045) (Elective - I)

Time : 3 Hours]   *[Max. Marks :100*

Instructions to the candidates:

1)   Answers to the two sections should be written in separate books.

2)   Neat diagrams must be drawn wherever necessary.

3)   Figures to the right indicate full marks.

4)   Use of logarithmic tables, slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.

5)   Assume suitable data, if necessary.

6)   All questions are compulsory.

SECTION - I

Q1) a) 'Operations Research' is a bunch of mathematical techniques? Comment.
        [4]

   b) An advertising company wishes to plan its advertising strategy in three different media - TV, Radio and Magazines. The purpose of advertising is to reach as large a number of potential customers as possible. Following data havebeen obtained from market survey.

	TV	Radio	Magazine I	Magazine II
Cost of an advertising unit	Rs 30,000	Rs 20,000	Rs,15,000	Rs 10,000
No. of potential customers reached per unit	2,00,000	6,00,000	1,50,000	1,00,000
No. of femal customers reached per unit	1,50,000	4,00,000	70,000	50,000

The company wants to spend not more than Rs 4,50,000 on advertising. Following are the further requirements that must be met:-

i) At least 1 million exposures take place among femal customers.

ii) Advertising on magazines be limited to Rs. 1,50,000.

iii) At least 3 advertising units be brought on Magazine I & 2unit in II.

iv) The number of advertising units on TV & Radio should each be between 5 & 10.

Formulate an L.P. model for the problem. Do not solve further. **[7]**

If problem is to solve by simplex method, how many total number of variables are involved, of each type? **[3]**

c) Define the following terms related to L.P. **[4]**

   i) Infeasible solution   ii) Non basic variable

   iii) Optimum solution   iv) Constraint

<div align="center">OR</div>

a) Use simplex method to solve the L.P.P. **[8]**

Max $Z = 4x_1 + 10x_2$

S.T. $2x_1 + x_2 \leq 50, 2x_1 + 5x_2 \leq 100, 2x_1 + 3x_2 \leq 90, x_1, x_2 \geq 0$

b) Discuss in brief two-phase simplex algorithm. **[4]**

c) Write a short note on Sensitivity Analysis. **[6]**

Q2) a) Explain vogel's Approximation method to obtain initial basic feasible solution for a transportation problem with any suitable data & Check this solution, whether optimum or not by UV method. If not, obtain optimum solution. **[12]**

b) State the fundamental theorems used to solve assignment problem. **[4]**

<div align="center">OR</div>

a) A group of friends, 5 boys & 5 girls, like each other and decide to marry amongst themselve with the objective of maximising the total happiness of the group through monogamy. Table 1 gives the index of preference (aij) of the ith girl to j^{th} boy, and table 2 gives the index of preference (bji) of jth boy for i^{th} girl. The coefficient Cij = aij + bij is taken as a measure of happiness of the pain as a married couple.

   i) What is your match making decision if total Cij for all group is to be maximised? **[7]**

   ii) How this decision will be modified if you happen to be 'Ramesh' and you selfishly decide to exercise your personal preference & then decide 'match-making'? **[5]**

Table 1

	Ramesh	Paresh	Aditya	Yash	Shashi
Lina	4	5	4	5	9
Mona	5	6	3	8	8
Nina	4	7	7	7	6
Tina	2	3	6	3	7
Hina	2	5	2	7	4

Table 2

	Ramesh	Paresh	Aditya	Yash	Shashi
Lina	9	10	6	7	5
Mona	5	2	9	7	3
Nina	6	2	7	7	4
Tina	5	2	8	7	2
Hina	4	1	2	7	6

b) Discuss in brief the 'transship ment problem'. **[4]**

Q3) a) A manufacturing company purchases 9,000 parts of a machine for its annual requirements, ordering one month's requirement at a time. Each part cost Rs. 20. The ordering cost per order is Rs 15 and the carrying charges are 15 percent of the average inventory per year. You have been advised to suggest a more economical purchasing policy for the company. What advice would you offer, and how much would it save the company per year? **[8]**

b) Discuss the concept of cutting plane algorithm in Integer programming. **[4]**

c) Discuss in brief the ABC Analysis. **[4]**

OR

Write short notes (any three): **[16]**

a) Non linear programming problems.

b) Dynamic programming

c) Inventory related costs

d) Probabilistic Inventory models.

SECTION - II

Q4) a) Discuss the theory of dominance in Games Theory. **[4]**

b) Solve the following game by Dominance. **[5]**

Player B

		b_1	b_2	b_3	b_4	b_5
	a_1	1	3	2	8	4
Player A	a_2	3	4	1	5	6
	a_3	6	5	7	6	5
	a_4	2	0	6	3	1

c) For any 2×2 two person zero - sum game without any saddle point, having pay off matrix for player A as.

Player B

		B_1	B_2
	A_1	P_{11}	P_{12}
Player A	A_2	P_{21}	P_{22}

Find the optimal mixed strategic & value of the game. **[7]**

OR

There are two offers of coal handling equipment in a thermal power station:
'Offer A': Cost Rs. 20,00,000/-, Capacity - 200 tonne/hr.

Period (year)	I	II	III	IV	V	VI
Operating cost in thousand Rupees	120	130	140	160	190	220
Resale value (thousand Rupees)	1600	1550	1450	1300	1100	800

'Offer B': Cost Rs. 40,00,000/-, Capacity - 300 tonne/hr.

Period (year)	I	II	III	IV	V	VI
Operating cost in thousand Rupees	140	145	151	160	172	190
Resale value in (thousand Rupees)	3500	3400	3250	3050	2800	2500

Which offer should be accepted consistent with optimum replacement policy for a minimum average annual cost? When the replacement should be done? **[16]**

Q5) a) Mention any four optimality criteria for sequencing problem. **[4]**

b) Derive the expression for minimum cost service rate in queuing no problem. **[6]**

c) Assume a single channel service system of a library in a school. From the past experience it is known that on an average every hour 8 students visits. Issue of the books is on an average rate of 10per hours. Determine the following.

  i) Probability of the assistant librarian being busy. **[2]**

  ii) Probability that there are atleast 3 students in the system. **[2]**

  iii) Expected time that a student is in queue. **[2]**

OR

a) Determine the minimum time needed to process two jobs on four machines M_1, M_2, M_3 and M_4. The technological order for these jobs are given as **[7]**

Job $1 - M_1 - M_2 - M_3 - M_4$, Job $2 - M_4 - M_2 - M_1 - M_3$ processing time (in hours) are given as under

	M_1	M_2	M_3	M_4
Job 1	5	7	8	4
Job 2	5	8	6	9

b) A tourist car operator finds that during the past few months the car's use has varied 80 much that the cost of maintaining the car has varied considerably. During the past 200 days the demand for the car fluctuated given below:

Trip per week	–	0	1	2	3	4	5
Frequency	–	16	24	30	60	40	30

Using following Random numbers simulate the demand for a 10 - week period. (R. numbers – 82, 95, 18, 96, 20, 84, 56, 11, 52, 03). **[9]**

Q6) A Project has following data with duration in weeks.

Activity	–	1 - 2	1 - 3	1 - 4	2 - 5	3 - 5	4 - 6	5 - 6
Optimistic time	–	1	1	2	1	2	2	3
Most likely time	–	1	4	2	1	5	5	6
Pessimistic time	–	7	7	8	1	14	8	15

a) Draw the network, find expected duration & identity critical path. **[6]**

b) Find out floats for activity 2 – 5. **[3]**

c) What is the probability that the project will be completed 4 weeks latter than expected? **[3]**

Given Z = −1.0 0   − 1.33   − 2.00

p =   0.15   .091   0.028

d) Differentiate between PERT & CPM. **[6]**

<div align="center">OR</div>

a) Write a short note on 'Gantt Charts in Project Management. **[5]**

b) State the Fulkerson's rules for drawing the network with suitable example. **[5]**

c) Define 3 types of floats. **[3]**

d) Discuss probability considerations in Project Management. **[5]**

<div align="center">❄ ❄ ❄</div>

P421

[4064] - 32

B.E. (Mechanical)
POWER PLANT ENGINEERING
(2003 Course) (402048) (Sem. - II)

Time : 3 Hours]   *[Max. Marks :100*

Instructions to the candidates:

1)   *Answer three questions from section I and three questions from section II.*

2)   *Answers to the two sections should be written in separate books.*

3)   *Neat diagrams must be drawn wherever necessary.*

4)   *Figures to the right indicate full marks.*

5)   *Use of logarithmic tables, slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.*

6)   *Assume suitable data, if necessary.*

SECTION - I
Unit - I

Q1) a) Explain with sketch the following circuits.   **[8]**

     i)   Air and gas circuit.

     ii)   Cooling water circuit.

   b) List and explain in brief the factors to be considered for the selection of a steam power plant (coal).   **[8]**

OR

Q2) a) What are pumped storage plants? What are their advantages and limitations? Where such plants are possible to instal? Draw diagram. **[8]**

   b) With neat sketch explain Boiling Water Reactor (BWR) and Pressurised Water Reactor (PWR).   **[8]**

Unit - II

Q3) a) What are the major advantages of coal benefication? What is Coal Oil Mixture (COM)? How it is prepared?   **[8]**

   b) Explain the working of electrostatic precipitator with sketch. What are its advantages and disadvantages.   **[8]**

OR

Q4) a) What do you understand by FBC? Explain its working principle with neat sketch. **[8]**

b) Write a note on inplant handling of coal. **[8]**

Unit - III

Q5) a) Draw a neat sketch of Benson boiler and discuss its relative merits and demerits. **[8]**

b) In a single heater regenerative cycle steam enters the turbine at 30 bar, 400°C and the exhaust pressure is 0.1 bar. The feedwater heater is a direct contact type which operates at 5 bar. Find: **[10]**

   i) The efficiency and steam rate of the cycle.

   ii) Increase in mean temperature of heat addition, efficiency and steam rate as compared to the cycle without regeneration.

OR

Q6) a) Sketch a typical layout of a steam power plant with superheating, reheating and regenerative feedheating. Draw T-s diagram. **[6]**

b) In a thermal power plant of 60 MW capacity, boiler supplies heat at 100 bar, 400°C. The steam expands to 20 bar in the HP turbine. Steam is then reheated to 380°C in a reheater. The steam then expands to a condenser pressure of 0.05 bar. The Pressure loss in the reheater is 1 bar. Taking isentropic efficiency in both stages of expansion as 80%, determine the steam generating capacity in Tons/hour. Assume transmission efficiency from turbine to generator as 98%, and generator efficiency as 95%. Find the overall efficiency of the plant. Neglect pump work. Draw schematic of the plant and represent the cycle on T-s diagram. **[12]**

SECTION - II
Unit - IV

Q7) a) Derive the expression relating Area, Velocity and Mach number for a varying cross section. Show the sections for supersonic, subsonic nozzles. **[8]**

b) Steam enters a convergent - divergent nozzle at 10 bar, 240°C with an approach velocity of 50m/s. It is discharged at 0.5 bar, with a velocity of 978m/s. Expansion is isentropic upto throat and with friction in the divergent part. Determine **[10]**

   i) Final quality of steam.

   ii) Diameter at exit if throat diameter is 10 mm.

   iii) Number of nozzles required for a steam flow rate of 60 kg/min.

   iv) Nozzle efficiency.

OR

Q8) a) Define the terms: **[8]**
i) Condenser efficiency
ii) Vacuum efficiency.
iii) Degree of super saturation
iv) Degree of undercooling.

b) The observations recorded during the trial on a steam condenser are given below: **[10]**
Condenser vacuum = 685 mm of Hg; Barometer reading = 765mm Hg; Mean condensate temperature = 34°C; Hot well temp. = 28°C; Condensate formed = 1750kg; Inlet and outlet temperature of circulating cooling water are 18°C and 30°C respectively. Quantity of cooling water = 1300 kg/min.
Determine:
i) Vacuum efficiency.
ii) Undercooling of condensate.
iii) Condenser efficiency.
iv) Condition of steam at condenser inlet.
Take C_p for water = 4.187kJ/kg K.
R for air = 0.287 kJ/kg K.

Unit - V

Q9) a) What do you understand by compounding of turbines? What is its necessity. Explain any one type of compounding with sketch. **[8]**

b) Steam enters an impulse wheel having a nozzle angle of 20° at a velocity of 450m/s. The exit angle of moving blades is 20° and the relative velocity of steam may be assumed to remain constant over the moving blades. If the blade speed is 180m/s, determine **[8]**
i) Blade angle at inlet
ii) Work done per kg of steam
iii) Power developed when steam supplied to turbine is 5kg/s.
iv) Diagram efficiency.

OR

Q10) a) Derive the expression for diagram efficiency of a reaction turbine and

hence show that $\eta_{max} = \dfrac{2\cos^2 \alpha}{1 + \cos^2 \alpha}$ where α – blade inlet angle. **[8]**

b) In a parsons reaction turbine the inlet blade angles are 20° and 35° of the fixed and moving blades respectively. The mean diameter of the stage is 1m, height of the blades is 10cm and speed of 5000 rpm. Steam pressure at the stage is 1.9 bar and the dryness fraction is 0.9. Calculate the power developed at the stage. **[8]**

Unit - VI

Q11) a) Define: **[6]**

      i)   Load factor

      ii)   Reserve factor

      iii)   Capacity factor

      iv)   Plant use factor.

  b) The maximum demand of a power station is 96000 kW and daily load curve is described as follows: **[10]**

Time (hrs).	0-6	6-8	8-12	12-14	14-18	18-22	22-24
Load (MW)	48	60	72	60	84	96	48

      i)   Determine the load factor of power station.

      ii)   What is the load factor of standby unit rated at 30 MW that takes up all load in excess of 72 MW. Also calculate use factor.

<div align="center">OR</div>

Q12) a) Explain the economic scheduling principle for load distribution and prove that combined input is minimum if the incremental heat rate of each unit is same. **[8]**

  b) Discuss in detail how unit energy cost is calculated. What are fixed and variable costs. **[8]**

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P438

[4064] - 84

B.E. (Electrical)

CONTROL SYSTEM - II

(2003 Course) (403145) (Sem. - I)

Time : 3 Hours]   *[Max. Marks :100*

Instructions to the candidates:

1)   Answer three questions from section I and three questions from section II.

2)   Answers to the two sections should be written in separate books.

3)   Neat diagrams must be drawn wherever necessary.

4)   Figures to the right indicate full marks.

5)   Use of logarithmic tables, slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.

SECTION - I

Q1) a) Define following terms: **[6]**

   i)   State variables   ii)   State space

   iii)   State vector

   b) Convert the given differential equation into phase variable form.   **[6]**

$$\frac{d^3y}{dt^3} + 2\frac{d^2y}{dt^2} + 3\frac{dy}{dt} + 4y = 5u(t)$$

   c) Convert the given transfer function into canonical state variable form. **[6]**

$$\frac{C(s)}{R(s)} = \frac{s}{s^2 + 5s + 6}$$

OR

Q2) a) State advantages of state space technique.   **[6]**

   b) Obtain the transfer function for the system having state model as   **[6]**

$$\begin{bmatrix} \dot{X}_1 \\ \dot{X}_2 \end{bmatrix} = \begin{bmatrix} -4 & -1 \\ 2 & -1 \end{bmatrix} \begin{bmatrix} X_1 \\ X_2 \end{bmatrix} + \begin{bmatrix} 3 \\ 2 \end{bmatrix} u$$

   c) Explain terms   **[6]**

   i)   Physical variables   ii)   Phase variables

   iii)   Canonical variables

Q3) a) Find eigen values and eigen vectors of following matrix A. **[8]**

$$A = \begin{bmatrix} 0 & 1 & 0 \\ 3 & 0 & 2 \\ -12 & -7 & -6 \end{bmatrix}$$

b) Obtain state transition matrix of following matrix A. **[8]**

$$A = \begin{bmatrix} 0 & 6 \\ -1 & -5 \end{bmatrix}$$

OR

Q4) a) Obtain solution of state equation $\dot{X} = AX$. **[10]**

$$A = \begin{bmatrix} 1 & -2 \\ 2 & -5 \end{bmatrix} \quad X(0) \begin{bmatrix} 10 \\ 10 \end{bmatrix} \quad y = \begin{bmatrix} 1 & 0 \end{bmatrix} X$$

b) State properties of state transition matrix. **[6]**

Q5) a) Define controllability and observability. Explain Kalman's method to determine controllability and observability. **[8]**

b) Investigate the controllability and observability of the system represented by **[8]**

$$\dot{X} = \begin{bmatrix} 0 & 1 & 0 \\ 2 & 2 & 0 \\ -2 & -4 & -3 \end{bmatrix} X + \begin{bmatrix} 1 \\ 1 \\ 0 \end{bmatrix} u \quad y = \begin{bmatrix} 1 & 1 & 0 \end{bmatrix} X$$

OR

Q6) a) Explain Ackerman's method for pole placement using. State feedback. **[8]**

b) For a system defined by $\dot{X} = AX + Bu$. **[8]**

$$A = \begin{bmatrix} 1 & 1 \\ 1 & 1 \end{bmatrix} \quad \& B = \begin{bmatrix} 1 \\ 0 \end{bmatrix}$$

It is desired to place close loop poles at s = 0 & s = –0.5 using state feed back controller. Determine the state feedback gain matrix K.

SECTION - II

Q7) a) Derive describing function of relay with dead zone. **[8]**

b) Classify different nonlinearities and explain commonly occuring nonlinearities with their input output characteristics. **[8]**

OR

Q8) a) In a unity feedback control system, an ideal relay with output equal to ± 1 unit is connected in cascade with linear transfer function

$$G(s) = \frac{10}{s(s+1)(s+2)}$$

construct G(jw) and $-1/K_N(x, w)$ plots. Determine the amplitude and frequency of the limit cycle if it exists. **[10]**

b) What are limit cycles. How limit cycles are determined from describing function. **[6]**

Q9) a) Explain various types of singular points with the help of neat sketches of the corresponding phase plane trajectories. **[8]**

b) Explain the term isocline in connection with phase plane trajectory. Explain method of constructing phase trajectory using isocline. **[8]**

OR

Q10) a) Define and explain terms: stability, Asymptotic stability and global stability in the sense of lyapunov. **[8]**

b) Classify following scalar functions with justification **[8]**

i) $V(x) = 10x_1^2 + 4x_2^2 + x_3^2 + 2x_1x_2 - 2x_2x_3 - 4x_1x_3$

ii) $V(x) = -x_1^2 - \dfrac{2x_2^2}{1+x_2^2}$

Q11) a) Explain different performance index as used in optimal control theory. **[6]**

b) Explain factors considered while designing optimal controller. **[6]**

c) Explain method of calculus of variation used for optimal control design. **[6]**

OR

Q12) Write notes on: **[18]**

a) Mechanical components like mass, spring, friction, gears.

b) Hydraulic actuators

c) Proximity sensors

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P439

[4064] - 88

B.E. (Electrical Engineering)
PROJECT MANAGEMENT
(2003 Course) (403143) (Sem. - I) (Thoey) (Elective - I)

Time : 3 Hours]   *[Max. Marks :100*

Instructions to the candidates:

1) *Section I & Section II should be solved on separate Answere sheets.*

2) *Figures to the right indicates maximum marks for the respective questions.*

SECTION - I

Q1) Define Project management? Explain the concept of project life cycle with its phases?   **[16]**

OR

Q2) a) Explain various types of project Appraisal methods?   **[8]**

   b) Explain various types of project organizations?   **[8]**

Q3) a) State various factors which influence project selection?   **[8]**

   b) Explain various causes of project failures?   **[8]**

OR

Q4) a) Describe the concept of project cost estimation?   **[8]**

   b) Write a short note on financial evaluation of project.   **[8]**

Q5) Write short notes

   a) Gantt chart   **[6]**

   b) Activity on Arrow diagram   **[6]**

   c) Activity on node diagram   **[6]**

<div align="center">OR</div>

Q6) Write short notes

    a) Graphical Evaluation and Review Technique (GERT)   **[6]**

    b) Programme Evaluation and Review Technique (PERT)   **[6]**

    c) Critical Path Method (CPM)   **[6]**

<div align="center">

SECTION - II

</div>

Q7) a) Explain various functions of material management?   **[8]**

    b) Explain material requirement planning.   **[8]**

<div align="center">OR</div>

Q8) a) Explain Tendering? State Types of Tenders?   **[8]**

    b) Explain various methods of Buying?   **[8]**

Q9) a) Define Inventory Management? State various types of Inventory?   **[8]**

    b) Define concept of selective control of Inventories.   **[8]**

<div align="center">OR</div>

Q10) Define stores management? Explain various functions and types of stores in detail?   **[16]**

Q11) Define Risk? Define Risk management explain the concept of risk management in detail?   **[18]**

<div align="center">OR</div>

Q12) a) Explain various methods of risk measurement?   **[9]**

    b) Explain computer aided project management?   **[9]**

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[4064] - 91

P440

B.E. (Electrical)
SWITCHGEAR AND PROTECTION
(2003 Course) (403148) (Sem. - II)

Time : 3 Hours]   *[Max. Marks :100*

Instructions to the candidates:

1) *Answer three questions from section I and three questions from section II.*
2) *Answers to the two sections should be written in separate books.*
3) *Neat diagrams must be drawn wherever necessary.*
4) *Figures to the right indicate full marks.*
5) *Use of logarithmic tables, slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.*
6) *Assume suitable data, if necessary.*

SECTION - I

Q1) a) What do you mean by Back up protection? Compare it with main protection by giving examples on various points. **[8]**

     b) Explain the following terms. **[8]**

        i) Plug setting multiplier.

        ii) Time setting multiplier.

OR

Q2) a) Explain the various essential qualities of relay. **[8]**

     b) Derive the torque equation of induction type relay. **[8]**

Q3) a) Explain current chopping with neat wave form. **[6]**

     b) A 3–ph. 11 kv generator is connected to circuit breaker. The inductive reactor upto circuit breaker is 5Ω/ph. The distributed capacitor upto circuit breaker and between phase and neutral is 0.01 μf. Determine:**[10]**

        i) Peak restriking voltage.

        ii) Time for peak restriking voltage.

        iii) Frequency of restriking voltage.

        iv) Maximum RRRV.

OR

Q4) a) Explain and derive the expressions for following terms **[8]**

   i)   Restriking voltage

   ii) RRRV

   iii) Frequency of oscillation.

b) Explain the arc interruption theories with their limitations. **[8]**

Q5) a) Explain working and construction of air break circuit breaker. **[8]**

b) Describe the terms related to rating of EHV circuit breaker. **[10]**

OR

Q6) Write short notes on: **[18]**

a) Autoreclousere

b) GIS

c) VCB with advantages and disadvantages.

SECTION - II

Q7) a) Explain the different types of faults occuring in the alternator. **[8]**

b) A 3–ph. 11kv, 10MVA. generator is delivering a load of 8MW at p.f = 0.8 lagging. Find the neutral resistance, if 10% stator winding is unprotected for earth fault. The relay setting is 20% and per phase armature reactance is 10%. **[8]**

OR

Q8) a) With neat connection diagram, explain the mer2price protection scheme for $\Delta - Y$ connected power transformer. **[8]**

b) A 3–ph transformer having a line voltage ratio 400/33000V is connected in Star-Delta. The CTS on 400V side have current ratio of 1000/5. What must be ratio of CTS on 33000V. Also sketch the connection diagram. **[8]**

Q9) a) Discuss the effect of power swing and arc resistance on performance of distance relay. **[8]**

b) Obtain the universal torque equation for distance relay. **[8]**

<div align="center">OR</div>

Q10) a) With neat block diagram, explain carrier current protection for EHV lines.

[8]

b) Compare Impedance relay, Mho relay and Reactance relay. **[8]**

Q11) a) What are the merits and demerits of static relay with conventional electromagnetic relay. **[10]**

b) Explain numerical relay with block diagram. **[8]**

<div align="center">OR</div>

Q12) Write short notes on: **[18]**

a) Sampling theorem.

b) Time delay circuit in static relay.

c) Microprocessor based over current relay.

<div align="center">❄ ❄ ❄</div>

[4064] - 101

P441

B.E. (Electronics)
COMPUTER NETWORKS
(2003 Course) (Sem. - I) (404201)

Time : 3 Hours]   *[Max. Marks :100*

Instructions to the candidates:

    1)   *Answer any three questions from each section.*

    2)   *Answer three questions from section I and three questions from section II.*

    3)   *Answers to the two sections should be written in separate books.*

    4)   *Neat diagrams must be drawn wherever necessary.*

    5)   *Figures to the right indicate full marks.*

    6)   *Use of logarithmic tables, slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.*

    7)   *Assume suitable data, if necessary.*

SECTION - I

Q1) a)   Explain the various LAN topologies.   **[8]**

    b)   Compare OSI and TCP / IP.   **[10]**

<div align="center">OR</div>

Q2) a)   Differentiate between LAN, MAN & WAN   **[8]**

    b)   Explain the advantages of networking also, compare the wired and wireless communication.   **[10]**

Q3) a)   Compare various LAN topologies on the basis of number of nodes, modulation technique and data rate for any two transmission media. **[8]**

    b)   Explain the circuit switching and message switching.   **[8]**

<div align="center">OR</div>

Q4) a)   Explain the advantages of packet switching.   **[8]**

    b)   Compare TDM and FDM for channel.   **[8]**

Q5) a) Explain the advantages of dynamic channel allocation. **[8]**

b) State and explain the analysis for channel allocation for increase in numbers of node, time for each node reduces in TDM/FDM (for state allocation). **[8]**

OR

Q6) a) Explain any two collision free protocol. **[8]**

b) Explain the hidden station and exposed station problem for wireless LAN. **[8]**

SECTION - II

Q7) a) Explain services offered by virtual circuit & Datagram **[6]**

b) Explain Dijkstra algorithm with an example. **[10]**

OR

Q8) a) What do you mean by selective routing? Explain its advantages and disadvantages. **[8]**

b) Explain upward & downward multiplexing for transport layer. **[8]**

Q9) a) Explain the principle of cryptography. Also explain the 'p' and 's' block used for cryptography. **[8]**

b) Explain the public key algorithm. **[8]**

OR

Q10) a) Explain DES algorithm for 64 - bit. **[8]**

b) Explain the DNS services. **[8]**

Q11) a) Compare IPv - 4 and IPv - 6 **[8]**

b) Explain the subnetting. **[10]**

OR

Q12) Explain any three protocol. **[18]**

a) RPC   b) IGMP

c) ARP   d) RARP

e) SMTP

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P445

[4064] - 105

B.E. (Electronics)

EMBEDDED SYSTEM DESIGN

(2003 Course) (Sem. - I) (Elective - I) (404205)

Time : 3 Hours]   *[Max. Marks :100*

Instructions to the candidates:

1) *Answer any three questions from each section.*

2) *Answer three questions from section I and three questions from section II.*

3) *Answers to the two sections should be written in separate books.*

4) *Neat diagrams must be drawn wherever necessary.*

5) *Your answers will be valued as a whole.*

6) *Use of logarithmic tables, slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.*

7) *Assume suitable data, if necessary.*

SECTION - I

Q1) a) What do you mean by design metrics? List the common design metrics with examples? What are the key design challenges.   **[10]**

b) List commonly used serial Bus Protocol in Embedded. Explain either CAN/I^2C bus protocol.   **[8]**

OR

Q2) a) What do you mean by embedded system? How they are classified? Explain the basic building blocks of the hardware in a embedded system.   **[10]**

b) Explain the blue tooth communication protocol.   **[8]**

Q3) a) Describe the processor selection criterion for embedded system with proper examples.   **[10]**

b) What are the characteristics of shared databug.   **[6]**

OR

Q4) a) Explain the activities of embedded operating system.   **[8]**

b) Explain the software architecture of an embedded system.   **[8]**

Q5) a) Explain the productivity tools for developing software systematecally.

[8]

b) What is the re-entrant function? State the criterion to decide the re-entrant function. **[8]**

OR

Q6) a) Explain the different types of ROM and RAM devices used in embedded systems. **[8]**

b) What is a task? What are different state of task? Draw a task state diagram.

[8]

SECTION - II

Q7) a) Explain the methods of protection of shared data. **[7]**

b) Explain in detail following scheduling algorithms. **[7]**

i) First - in - first - out

ii) Round - Robin

iii) Round - Robin with priority.

c) Explain interrupt routines in RTOS environment. **[4]**

OR

Q8) a) Explain in detail pipe and event in RTOS and its application. Explain the implementation of any one in embedded C. **[8]**

b) Explain the task states. **[6]**

c) Explain deadly embrace. **[4]**

Q9) a) What do you mean by RT Linux Module? Explain in brief. **[4]**

b) What are the functional calls provided for timer management in RT Linux.

[6]

c) How does a mailbox message differ from queue message in μc/os - II

[6]

OR

Q10) a) Explain the following functions in detail & their usage in μc/cos - II along with implementation in embedded C. **[8]**

      i)   Jask create

      ii)   Message queue

   b) Compare any four commercial mobile computing operating system. **[8]**

Q11) Explain the embedded system used in a digital camera. **[16]**

<div align="center">OR</div>

Q12) a) Explain with neat diagram of an adaptive cruise control system in a car. **[8]**

   b) Explain the basic features of smart card hardware. **[8]**

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[4064] - 114

P449

B.E. (Electronics)
ARTIFICIAL INTELLIGENCE
(404212) (2003 Course) (Elective - II)(Sem. - II)

Time : 3 Hours]   *[Max. Marks :100*

Instructions to the candidates:

1) *Answer three questions from section I and three questions from section II.*
2) *Answers to the two sections should be written in separate books.*
3) *Neat diagrams must be drawn wherever necessary.*
4) *Use of logarithmic tables, slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.*
5) *Assume suitable data, if necessary.*

SECTION - I

Q1) a) Explain AO* algorithm with example.   **[8]**

b) Discuss various definitions of Artificial Intelligence (AI) . Explain why AI programs try to model human performance.   **[8]**

OR

Q2) a) What are different heuristic search techniques. Discuss in detail the steepest - ascent hill climbing technique.   **[8]**

b) How state space representation can be used for a water jug problem with respect to seven problem characteristics.   **[8]**

Q3) a) Write short note on secondary search.   **[8]**

b) Elaborate how simple facts are represented in logic with suitable examples. What are the different ways to represent a class membership.   **[8]**

OR

Q4) a) What is predicate logic. Explain the procedure to convert formulas into clause form.   **[8]**

b) With suitable example, explain how simple facts are represented in logic. What are different ways to represent a class membership.   **[8]**

Q5) a) Explain with suitable example how scripts can be used to represent knowledge. **[9]**

b) What is conceptual dependency. How it is used to represent knowledge. **[9]**

OR

Q6) a) Explain how frames can be used for knowledge representation. Give an example. **[9]**

b) What is meant by non-monotonic reasoning. Differentiate between statistical reasoning and probabilistic reasoning. **[9]**

SECTION - II

Q7) a) Explain in detail how hard problems are solved using a hierarchical planning. **[9]**

b) Describe how problems are solved with implementation using goal stack. **[9]**

OR

Q8) a) What is a planning system. Describe the different components of planning system. **[9]**

b) What is nonlinear planning. What are the steps involved in the nonlinear planning algorithm. **[9]**

Q9) a) Explain in detail back propagation algorithm. **[8]**

b) Write a note on Robot architectures. **[8]**

OR

Q10) a) Describe in detail how multilayer neural networks can be used for classification of handwritten digits. **[8]**

b) Develop waltz algorithm for labelling trihedral figures. **[8]**

Q11) a) Write a note on finite state machine. **[8]**

b) Explain how ATN is used for natural language understanding. **[8]**

OR

Q12) a) What is semantic analysis. With suitable example explain the conceptual parsing which uses conceptual dependency structures. **[8]**

b) What are the issues involved in natural language processing. Explain the steps involved in this process. **[8]**

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[4064] - 128

B.E. (E & TC)

ARTIFICIAL NEURAL NETWORKS

(2003 Course) (404218) (Sem. - I) (Elective - I)

Time : 3 Hours]   *[Max. Marks :100*

Instructions to the candidates:

1) *Answer three questions from section I and three questions from section II.*

2) *Answers to the two sections should be written in separate books.*

3) *Neat diagrams must be drawn wherever necessary.*

4) *Figures to the right indicate full marks.*

5) *Use of logarithmic tables, slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.*

6) *Assume suitable data, if necessary.*

SECTION - I

Q1) a) Compare the performance of biological and computer neural networks. Also explain briefly the operation of biological neural network. **[12]**

     b) Compare LMS, perceptron and delta learning laws. **[6]**

OR

Q2) a) Explain additive activation models and shunting activation models in detail. **[9]**

     b) Explain the basic laws- **[9]**

       i) Correlation learning law.

       ii) Principal component learning.

       iii) Competitive learning.

Q3) a) Explain the architecture of single layer perceptron and the training algorithm used in perceptron. **[8]**

     b) Explain the algorithm and architecture of MR-II **[8]**

Q4) a) Explain the architecture and algorithm used in Adaline network. **[8]**

b) Explain the algorithm used in MR - III. **[8]**

Q5) a) Explain the architecture and the algorithm used in Boltzmann machine. **[10]**

b) Explain simulated annealing. **[6]**

OR

Q6) a) Explain the architecture and algorithm used in Discrete Hopfield Network. **[10]**

b) What are hard problems in pattern storage tasks. **[6]**

SECTION - II

Q7) a) Explain the architecture and algorithm used in ART1 network. **[12]**

b) Explain the maxnet network with algorithm used for the same. **[6]**

OR

Q8) a) Explain the network topologies used for som and also explain the algorithm for the same. **[12]**

b) Explain simple competitive networks with algorithm. **[6]**

Q9) a) Explain:- **[9]**

i) Auto associative memory.

ii) Hetero associative memory.

iii) Bidirectional associative memory with examples.

b) Explain the architecture of RBF networks. Draw various RBF functions. **[7]**

OR

Q10) a) What is temporal associative memory. What are its limitations in recalling a sequence of temporal patterns. **[8]**

b) Explain the algorithm used in heteroassociative networks. **[8]**

Q11) a) Explain how neural network principles are used for texture analysis. **[8]**

b) Explain how neural network principles are used for hand written characters in a cursive script. **[8]**

OR

Q12) a) How neural network ideas are used in the development of phonetic type writer. **[8]**

b) What is local minima problem in optimization. How neural network is used in it. **[8]**

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P458

[4064] - 130

B.E. (Electronics & Telecommunication)
ELECTRONIC MEASUREMENT SYSTEMS
(2003 Course) (404422) (Sem. - II)

Time : 3 Hours]   *[Max. Marks :100*

Instructions to the candidates:

1) *Answer any three questions from each section.*
2) *Answers to the two sections should be written in separate books.*
3) *Neat diagrams must be drawn wherever necessary.*
4) *Figures to the right indicate full marks.*
5) *Your answers will be valued as a whole.*
6) *Use of logarithmic tables, slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.*
7) *Assume suitable data, if necessary.*

SECTION - I

Q1) a) With reference to DMM explain. **[9]**

     i)   Sensitivity

     ii)   Resolution and

     iii)   Automatic zero in DMM

     b) Explain basic 'Q' meter with neat diagram. **[9]**

OR

Q2) a) Explain vector voltmeter. **[10]**

     b) Explain source of error in 'Q' meter. **[8]**

Q3) a) Explain in brief - International standards, primary standards, secondary standards and working standards. **[8]**

     b) Explain various methods for regression analysis and advantages of regression analysis. **[8]**

OR

Q4) a) Explain any one method for high frequency measurement. **[8]**

     b) Draw block diagram of basic frequency counter and explain with wave form its working. **[8]**

Q5) a) Explain sampling method used for sampling CRO. **[8]**

b) Explain DSO with block diagram. **[8]**

OR

Q6) a) Explain different probes used in CRO. **[8]**

b) Explain importance of delayed sweep used in CRO. **[8]**

SECTION - II

Q7) a) Explain FFT with neat block diagram. **[8]**

b) Explain applications of spectrum analyser. **[8]**

OR

Q8) a) Explain with neat diagram logic analyzer. **[8]**

b) Write short note on signature analyzer. **[8]**

Q9) a) Explain radio receiver test using computer. **[8]**

b) Define the term selectivity and SNR with reference to radio receiver. **[8]**

OR

Q10) a) Explain SINAD test. **[8]**

b) Explain vector network analyzer. **[8]**

Q11) Write short note on: **[18]**

a) IEEE 488 BVS

b) Computer controlled test measurements.

OR

Q12) a) Explain importance of virtual instruments. **[6]**

b) Explain use of virtual measurement for ASK, PSK and TDM. **[12]**

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[4064] - 134

B.E. (E & TC)

DIGITAL IMAGE PROCESSING

(2003 Course) (Sem. - II) (404225) (Elective - II)

Time : 3 Hours] *[Max. Marks :100*

Instructions to the candidates:

    1)   *Answer any three questions from each section.*

    2)   *Answers to the two sections should be written in separate answer books.*

    3)   *Figures to the right indicate full marks.*

    4)   *Neat diagrams must be drawn wherever necessary.*

    5)   *Assume suitable data, if required.*

SECTION - I

Q1) a) Explain image re-sampling using image interpolation. **[8]**

    b) Explain

        i)   Brightness adaptation

        ii)   Simultaneous contrast **[8]**

OR

Q2) a) Discuss various color models and their applications. **[8]**

    b) Explain pseudo-coloring using intensity color transformation. Give its applications. **[8]**

Q3) a) Compare

        i)   Averaging filter

        ii)   Median filter

        iii) Gaussian filter **[8]**

    b) Explain image enhancement by contrast stretching **[8]**

OR

Q4) a) What is power law transformation. Give its applications. **[8]**

    b) What is sharpening filter? Where it is required? **[8]**

Q5) a) What is edge linking? Explain edge linking using local processing. **[9]**

b) Explain segmentation using region growing **[9]**

OR

Q6) a) Explain segmentation using thresholding. What is global threshold and local threshold? How we can select threshold value for optimum segmentation? **[9]**

b) Explain edge detection using Robert's cross operator. What are the challenges in edge detection in case of Noisy image? **[9]**

SECTION - II

Q7) a) What is morphological skeleton operation? Explain **[8]**

b) What is 'Region descriptor'? Explain with examples. **[8]**

OR

Q8) a) With block diagram explain image restoration process **[8]**

b) Explain restoration using 'Inverse filter' **[8]**

Q9) a) Define discrete cosine transform. Explain how it can be used for image compression. **[8]**

b) Explain arithmetic coding. **[8]**

OR

Q10) a) What is lossy compression and lossless compression? Give their performance parameters, applications, advantages and disadvantages. Whether JPEG compression standard, is for lossy or lossless compression? **[8]**

b) With the block diagram explain working of lossless predictive coding. **[8]**

Q11) Write short notes on: **[18]**

a) KL Transform

b) Discrete Fourier Transform

c) Haar Transform

OR

Q12) a) Discuss applications of image processing in biometric identification **[9]**

b) Explain working of digital camera **[9]**

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[4064] - 182

B.E. (Chemical)

CHEMICAL REACTION ENGINEERING - II

(2003 Course) (Sem. - I) (409343)

Time : 3 Hours]   *[Max. Marks :100*

Instructions to the candidates:

   1) *Answers to the two sections should be written in separate books.*

   2) *Neat diagrams must be drawn wherever necessary.*

   3) *Figures to the right indicate full marks.*

   4) *Use of logarithmic tables, slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.*

   5) *Assume suitable data, if necessary.*

SECTION - I

Q1) a) Develop a conversion - time expression for spherical particles of changing size in stoke's law regime using shrinking cone model. **[8]**

   b) A 200 ton solid hold up is needed in a single fluidised bed reactor for 99% conversion of particles of unchanging size where ash diffusion controls. What would be the holdup in two fluidised beds in series for identical conversion, feed rate, gas environment? **[8]**

OR

Q2) a) Detail out various contacting patterns in fluid solid non catalytic reactors with sketch of different reactors. **[4]**

   b) A pilot plant is to be built to explore the fluidised bed technique as a means of roasting zinc blended. The reactor is to have an internal dia. of 10cm and an underflow pipe 18cm from the bottom of the bed, feed to the experimental reactor is to be 35.5 gm/min. consisting of 40% of 10μ - radius particles and 60% of $40\text{-}\mu$ -radius particles. For the optimum gas velocity thr' the bed, the following bed characteristics can be estimated as follows: **[12]**

P.T.O.

K $(10\mu) = 0.4$/min, k$(40\mu) = 0.01$/min.

W = 1100 gm, $\tau(10\mu) = 2.5$ min, $\tau(40\ \mu) = 10$ min.

   i)   What conversion of Zns may be expected in this reactor?

   ii)   Find conversion if cyclone separator is used to separate and return the entaired solid particles to the reactor.

Q3) a) Draw various kinetic regimes for mass transfer and reaction in fluid - fluid reaction. **[8]**

   b) We plan to use an NaOH solution to hasten the removal of CO_2 from air at 25°C. **[8]**

$K_{Ag}\ a = 80$ mol/hr lit atm, $K_{Al}a = 25$/hr, $H_A = 30$ atm lit/mol.

The rea^n is instantaneous and is represented by

$$CO_2 + 2OH^- \rightarrow H_2O + CO_3^{--}$$
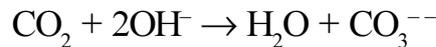
   i)   What form of rate eg^n should we use when $P_{Co_2} = 0.2$ atm and the sol^n is 0.2 N in NaOH?

   ii)   How much can absorption be speeded compared to physical absorption with pure water?

   c) Define Film conversion parameter and explain it's significance. **[2]**

<div align="center">OR</div>

Q4) a) Derive global rate of reactions for fast reactions in fluid - fluid reactors. (cases C & D). **[8]**

   b) Component 'A' from gas is to be reduced from 2% to 5 ppm by counter current contact with liquid containing reactant 'B' of concentration $C_B = 500$ mol/m^3. Find the height of the tower needed. **[10]**

Data :- $k_{Ag}a = 3 \times 10^{-4}\ \dfrac{mol}{s.m^3.Pa}$, $k_{Al}a = k_{Bl}\ a = 6 \times 10^{-4}$/sec.

$$H_A = 10\ \frac{Pam^3}{mol}\ ,\ \ G = 20\ \frac{mol}{sec.m^2}\ ,\ \ L = 80\ \frac{mol}{sec.m^2}$$

Total pressure = 1 bar.

Q5) a) State various adsorption isotherms and derive the expression for Lang muir adsorption isotherm with all assumptions. **[8]**

   b) What is pore-volume distribution? Describe the mercury penetration method for measurement of pore-volume distribution. What is N_2 - desorption method? **[8]**

<div align="center">OR</div>

Q6) a) Explain different causes of catalyst deactivation. **[6]**

b) Low temp. (–195.8°C) nitrogen adsorption data were obtained for an Fe–Al$_2$O$_3$ ammonia catalyst. The results for a 50.4 gm sample were.

[10]

Pressure; (mm Hg)	8	30	50	102	130	148	233	258	330	442	480	507
Vol^m adsorbed cm³ (at 0°C, 1 atm)	103	116	130	148	159	163	188	198	221	270	294	316

density of N$_2$ at – 195.8°C = 0.808 g/cc.

SECTION - II

Q7) a) Toluene (T) is adsorbed on the surface of the catalyst and reacts with H$_2$(H) in the gas phase to produce benzene (B) adsorbed on the surface and CH$_4$(μ) in the gas phase. C$_6$H$_6$ is then desorbed from the surface. The proposed mechanism is: **[12]**

$T_{(g)} + S \rightleftharpoons T.S$ .... (adsorption)

$H_{2(g)} + T.S \rightleftharpoons B.S + M_{(g)}$ .... (surface rea^n)

$B.S \rightleftharpoons B_{(g)} + S$ .... (desorption)
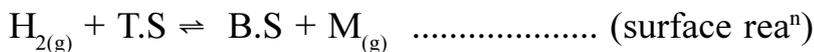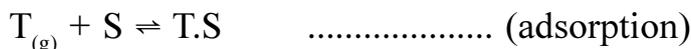
Develop a rate eq^n when surface rea^n controls.

b) Explain single site, Dual site and Eley - Reidel models. **[6]**

OR

Q8) a) In case of strong pore resistance, show that an nth order reaction behaves like a reaction of order (n + 1) /2. **[6]**

b) Estimate the temp. variations within the pellet and across the gas film for the reactions within a spherical catalyst pellet of 3 mm dia. **[8]**

Given : De = 6 × 10^{-5} (m³/ hr. m cat)

k$_{eff}$ = 1600 (J/hr.m cat °k), h = 160 (kJ / hr. m². cat °k)

ΔH = – 100 kJ / mol A, C$_{Ag}$ = 25 mol/m³.

$(-v_A)_{obs}$ = 2 × 10^5 (mol /hr.m³ cat)

c) Signify Wagner Modulus. **[4]**

Q9) A gas phase reaction A → 2R is carried out in an experimental isothermal plug flow reactor to determine the rate law. Outlet concentration of A is found at steady state in a number of runs by varying the amount of catalyst. Concentration of pure A feed is 50 mol/m³ and Feed flowrate is 0.3 m³/hr. Find the rate equation which fits the data. **[16]**

W (qm)	2.5	6.2	8.9	12.3	24.2
$C_A \left(\dfrac{\text{mol}}{\text{m}^3} \right)$	33.3	21.4	16.7	12.5	5.6

OR

Q10) a) Explain different types of reactors used in carrying out catalytic reactions. **[6]**

b) Kinetic experiments on the solid catalysed reaction A → 3R are conducted at 8 atm and 700°C in a basket type mixed reactor 960 cm³ in volume and containing 1 gm of catalyst of dia. dp = 3 mm. Feed consisting of pure A is introduced at various rates into the reactor and the partial press of A in the exit stream is measured for each feed rate. The results are as follows: **[10]**

Feed rate $\left(\dfrac{\text{lit.}}{\text{hr}} \right)$	100	22	4	1	0.6
P_A, out / P_A, in	0.8	0.5	0.2	0.1	0.05

Find the rate equation to represent the rate of rea^n.

Q11) a) Derive Michaelis – menten equation for the decomposition of urea using enzyme urease. The suggested mechanism is as follows: **[10]**

$$NH_2CONH_2 + urease \xrightarrow{\ k_1\ } [NH_2CONH_2.urease]^* - [1]$$

$$[NH_2CONH_2.urease]^* \xrightarrow{\ k_2\ } urease + NH_2CONH_2 - [2]$$

$$[NH_2CONH_2.urease]^* + H_2O \xrightarrow{\ k_3\ } 2NH_3 + CO_2 + urease - [3]$$
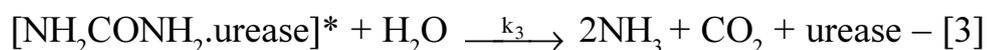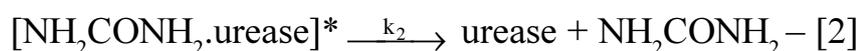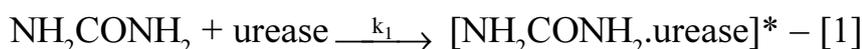
b) Explain Bubbling Fluidized bed(BFB) and different models used. **[6]**

OR

Q12) Write short notes: **[16]**
   a) Staged Adiabatic packed bed reactor.
   b) Bubble column reactor.
   c) The circulating fluidized bed reactor (CFB).
   d) Slurry Reactor.

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P478

[4064] - 230A

B.E. (Petrochemical)

CATALYSIS TECHNOLOGY AND FLUIDIZATION ENGINEERING

(Sem. - II) (2003 Course) (Elective - II) (412411)

Time : 3 Hours]   *[Max. Marks :100*

Instructions to the candidates:

    1)   *Answers any three questions from each section.*

    2)   *Answers to the two sections should be written in separate books.*

    3)   *Neat diagrams must be drawn wherever necessary.*

    4)   *Figures to the right indicate full marks.*

    5)   *Use of logarithmic tables, slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.*

    6)   *Assume suitable data, if necessary.*

SECTION - I

Q1) a) With help of suitable example explain principle of Homogeneous Catalysis.   **[6]**

     b) Define the following: **[6]**

        Activation site, Turnover Number, Selectivity and Functionality.

     c) With the help of neat sketch explain how catalyst changes reaction pathways.   **[6]**

Q2) a) Derive Langmuir Adsorption Isotherm with help of the important assumptions.   **[8]**

     b) Differentiate between Riedel Model and Langmuir Hinshelwood Model for catalytic reaction.   **[8]**

Q3) a) A specially designed catalyst with mass of 542.7 gm displaces 421.14 cm^3 Helium. The same catalyst sample is reported to displace 334.6 cm^3 of Mercury in another study. Calculate pore volume of the sample and particle porosity. **[8]**

b) For the catalytic gas phase reaction: $M + N \rightarrow P$, derive the rate expression considering Langmuir- Hinshelwood mechanism in terms of partial pressure of the respective components. Note that all the reactants and products are adsorbed appreciably. If some inert gas Helium is also present, this is also strongly adsorbed on the surface, write down the modified rate expression. **[8]**

Q4) a) What are promoters ? Why they are so useful in industrial catalysis? **[4]**

b) What is Sintering? Explain with help of neat sketch. **[4]**

c) Write down important characteristics needed for a catalyst sample to be suitable for industrial applications - Elaborate on each of them. **[8]**

Q5) Write short notes on: **[16]**
a) Zeolite Catalysts
b) Adsorption Isotherm
c) Deactivation vs. Poisoning
d) Multi-tubular Packed bed Catalytic Reactor

SECTION - II

Q6) a) Discuss advantages of fluidization and elaborate them. **[6]**

b) With help of neat diagram explain different regimes often encountered in fluidized bed systems. **[8]**

c) Obtain an mathematical expression of overall density of fluidized bed. **[4]**

Q7) a) Classify group of particles as done by Geldart. Provide appropriate examples of each group and indicate their characteristics. **[8]**

b) Name four different types of distributors used in the industrial scale fluidized bed. Provide sketches and discuss their merits and demerits. **[8]**

Q8) a) Discuss Kuni-Levenspiel model along with its important assumptions.

[8]

   b) With help of neat diagram explain bubble movement through the fluidized bed. Differentiate between clouded and cloudless bubble.   **[8]**

Q9) a) Develop a mathematical expression for fluidized bed heat transfer.   **[8]**

   b) Name various types of fluidized bed dryers and highlight their operations.

[8]

Q10) Write short notes on: **[16]**

   a) Agglomeration and Sintering

   b) Pneumatic Conveying.

   c) Modern generation FCC unit

   d) Bubble Coalescence and Breakup.

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[4064] - 255

P485

B.E. (Computer)
IMAGE PROCESSING
(2003 Course) (410445) (Elective - I) (Sem. - I)

Time : 3 Hours]   *[Max. Marks :100*

Instructions to the candidates:

1) *Attempt Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6 from section I and Q.7 or Q. 8, Q.9 or Q.10, Q.11 or Q.12 from section II.*

2) *Answers to the two sections should be written in separate books.*

3) *Neat diagrams must be drawn wherever necessary.*

4) *Use of logarithmic tables slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.*

5) *Assume suitable data, if necessary.*

SECTION - I

Q1) a) How DCT is related with DFT? Define 2–D DCT and discuss its various features. **[8]**

b) Compare Hadamad Transform with Haar Transform Represent Hadamad matrix of size 8×8. **[8]**

OR

Q2) a) What is the role of membership function in fuzzy logiz? How it is defined? How it can be used in Image processing? **[8]**

b) Discuss the terms scenes and images. Compare between monochrome and colour vision model. **[8]**

Q3) a) Explain the process of sampling and quantization in Image digitization. **[8]**

b) Explain the photometric model used for Image formation. **[8]**

OR

Q4) a) W.r.t. digital image, define the following terms: **[8]**

    i)   Distance function   ii)   Boundary pixel

    iii)   City - block distance   iv)   A frame F

b) Explain the Geometric model used for image formation. **[8]**

Q5) a) Discuss in detail the Huffman coding scheme used for image compression. Write the algorithm. What is entropy coding? **[10]**

b) What is Homomorphing filtering? How it can be used for Image enhancement? **[8]**

<div align="center">OR</div>

Q6) a) Explain the use of low pass filter and median filter in image smoothing. **[10]**

b) With mathematical representation, discuss in brief the following point operations. **[8]**

    i)   Contrast stretching   ii)   Intensity level slicing

<div align="center">

SECTION - II

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Q7) a) What is the use of derivative operators in edge detection? with algorithm discuss in detail the canny edge detection **[10]**

b) With suitable example, explain k-means clustering algorithm. **[8]**

<div align="center">OR</div>

Q8) a) Discuss the term Histogram and Histogram equilization. How Histogram of an Image is obtained? How it is useful in Image segmentation? **[10]**

b) With algorithm, discuss the use of component labelling algorithm for feature extraction. **[8]**

Q9) a) Explain in brief CMY and YIQ colour models. **[8]**

b) What is psendo colour processing? With mapping functions, discuss a simple scheme for psendo colouring. **[8]**

<div align="center">OR</div>

Q10) a) What is morphology? Define and explain Dilation operator used for morphology. **[8]**

b) How RGB image is represented and processed by digital computer? How it differs from a monochrome image? **[8]**

Q11) What is digital watermarking? State its applications. With suitable algorithms, discuss in detail the process of embedding and extraction of a digital watermark. **[16]**

<div align="center">OR</div>

Q12) Explain in detail the use of Image enhancement and segmentation in medical image processing. Discuss different methods/ algorithms in brief. **[16]**

<div align="center">❄ ❄ ❄</div>

P489

[4064] - 265

B.E. (Computer)

HIGH PERFORMANCE NETWORKS

(Sem. - II) (2003 Course) (Elective - II) (410451)

Time : 3 Hours]   *[Max. Marks :100*

Instructions to the candidates:

   1)   *Answer any three questions from each section.*

   2)   *Solve Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6 from section I and Q.7 or Q. 8, Q.9 or Q.10, Q.11 or Q.12 from section II .*

   3)   *Answers to the two sections should be written in separate answer books.*

   4)   *Figures to the right indicate full marks.*

   5)   *Neat diagrams must be drawn wherever necessary.*

   6)   *Assume suitable data, if necessary.*

SECTION - I

Q1) a) Discuss in short about various 1000 BASE - X physical layer Characteristics **[8]**

    b) Calculate the worst case channel efficiency for a stream of minimum length frame of 512 bits for 10,100 & 1000 Mbps Network. Which network performs badly? **[8]**

OR

Q2) a) Differentiate between 10 Mbps, 100Mbps and 1000Mbps networks based only on MAC characteristics. **[8]**

    b) Draw and explain 1000BASE X Auto negotiation base page message format **[8]**

Q3) a) Define the terms BRI and PRI? How many voice channels are supported by each of them **[6]**

    b) Draw and Explain the LAPF core Protocol frame format? What is the Significance of the DLCI field **[6]**

    c) Describe the various Frame relay Congestion control techniques **[6]**

OR

Q4) a) Differentiate between B-ISDN and ISDN from the application support Point of view **[6]**

b) Describe the SS7 protocol architecture **[6]**

c) Differentiate between Frame relay and ATM **[6]**

Q5) a) Explain the need of ATM Adaptation layer. What are the different types Supported ? For which type of Application AAL 5 can be used **[8]**

b) Draw and Explain the ATM Cell header Structure at U-N interface **[8]**

OR

Q6) a) What are the functions of Transmission Convergence (TC) sub layer? Draw And explain the cell delineation state diagram **[8]**

b) Describe any 4 ATM QOS parameters **[8]**

SECTION - II

Q7) a) List and explain various xDSL types (At least 4 points) **[8]**

b) Explain in detail about DMT processes? How it is related to xDSL **[8]**

OR

Q8) a) Draw and Explain A typical ADSL equipment configuration. **[8]**

b) How does ADSL different from ISDN in functionality? **[8]**

Q9) a) Explain the significance and working of RSVP **[8]**

b) Why Class based QOS is better than Flow Based QOS? Explain the concept Behind Differentiated services **[8]**

OR

Q10) a) What is MPLS? Draw and Explain the structure of label **[8]**

b) Describe the terms LER, LSR, LSP and FEC related to MPLS Network? **[8]**

Q11) a) Describe in detail 802.11a standard specifying frequency band, data rate supported, No of APs supported, spread spectrum etc. **[10]**

b) Why CSMA/CD protocol is not adopted in WiFi environment? What is the other alternative selected for the same **[8]**

OR

Q12) a) Differentiate between Fixed WiMax and WiFi Networks **[6]**

b) Explain the following terms

1) > Time Division Duplexing (TDD)

2) > Frequency division Duplexing (FDD) **[6]**

c) Comment on any 3 WiMax QOS classes along with the suitable Application support **[6]**

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P522

[4064] - 41

B.E. (Mechanical S/W)

DESIGN ENGINEERING

(Sem. - I) (2003 Course) (402061)

Time : 4 Hours]   *[Max. Marks :100*

Instructions to the candidates:

    1)   Answer three questions from Section I and three questions from Section II.

    2)   Answers to the two sections should be written in separate books.

    3)   Neat diagrams must be drawn wherever necessary.

    4)   Use of logarithmic tables, slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.

    5)   Assume suitable data, if necessary.

SECTION - I

Q1) a)   Write a Note : - Force Analysis of Bevel Gear Pair.   **[4]**

     b)   A straight bevel pinion having 25 teeth is made of alloy steel having ultimate tensile strength of 840 MPa. The pinion is to mesh with a gear having 60 teeth and made of alloy steel having ultimate tensile strength of 690 MPa. The pinion is connected to a 8.5 KW, 1440 rpm electric motor whose starting torque is 125% of the rated torque. Factor of safety is 1.1. Pinion and gear are hardened to 450 BHN and 400 BHN respectively. The deformation factor is 11000e N/mm where e is given by 5+0.4 ϕ. The factor ϕ is given as m+0.25 $\sqrt{d}$. The pinion and gear axes are at right angles. Design the gear pair using velocity factor $\dfrac{6}{6+v}$ and lewis form factor as Y = 0.484 – $\dfrac{2.87}{z}$ use standard module series as 2, 3, 4, 5, 6, 8 -----------.   **[14]**

<div align="center">OR</div>

Q2) a)   Explain : - Force Analysis of Worm Gear Drive.   **[4]**

b) A worm gear pair 2/40/10/4 is having phosphor bronze gear with ultimate tensile strength of 300 MPa. The worm is made of steel with ultimate strength of 740 MPa. Coefficient of friction is 0.03 and normal pressure angle is 20° Worm gear wear factor is 0.9 N/mm². The overall heat transfer coefficient is 18 W/M²°C. The permissible temperature rise for the lubricant is 50°C. The worm runs at 720 rpm and service factor is 1.5

Determine input power rating based on beam strength, wear strength and thermal considerations.

Assume effective surface area of gear box as 0.8 m² and factor of safety as 1.5. **[14]**

Q3) a) State different theories of failures used in design of thick cylinders subjected to internal pressure and their applicability under different situations. **[5]**

b) Explain classification of pressure vessels as per Is 2825 standard. **[5]**

c) A hydraulic cylinder with closed ends is subjected to an internal pressure of 15 MPa. The inner and outer diameters of cylinder are 200 mm and 240 mm respectively. Cylinder material is cast iron FG300. Determine factor of safety used in design. If cylinder pressure is further increased by 50%, what will be the factor of safety? **[6]**

OR

Q4) a) What is prestressing of thick cylinders? What is it's purpose? Explain any one method of prestressing. **[6]**

b) Following data refers to a vertical pressure vessel
   i) Shell dimensions : - 3000 mm inside diameter and 6m shell length.
   ii) Material : - Carbon steel with yield strength 225 MPa.
   iii) Corrosion rate : - 0.05mm per month.
   iv) Minimum life : - 80 months.
   v) Factor of safety : - 1.5.
   vi) Working pressure : - 0.75 MPa.
   vii) Design Pressure : - 10% extra.
   viii) Weld joint : - Double welded butt joint.
   ix) Radiography : - Spot radiographed.
   x) Ends :- Torispherical with crown radius as 2500mm. Design the shell thickness and dished end thickness Draw a neat sketch of pressure vessel with dimensions, weld lines and also indicate class of welds. **[10]**

Q5) a) What is 'Design for Manufacture'? Explain general principles to be followed while designing parts for manufacture. **[6]**

b) A cantilever beam is made of plain carbon steel 25C8 having mean yield strength of 280 N/mm² and standard deviation of 40 N/mm². It is subjected to a bending stress with a mean of 180 N/mm² and standard deviation of 20 N/mm². Determine

    i) Reliability of the beam.

    ii) The average factor of safety.

    iii) The minimum available factor of safety. **[10]**

<div align="center">OR</div>

Q6) a) Explain important considerations for designing components for casting.**[6]**

b) An assembly of three components A, B and C is as shown in fig. 1. The dimensions of three components are normally distributed and natural tolerance is equal to design tolerance as shown. Determine the percentage of assemblies where interference is likely to occur. **[10]**
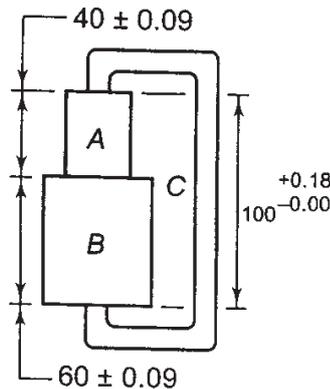
Fig. 1.
[Q. No. 6-b]

<div align="center"><u>**SECTION - II**</u></div>

Q7) a) State and explain the causes & remedies for stress concentration in machine elements. **[6]**

b) A transmission shaft having ultimate tensile strength of 500 MPa and yield strength of 300 MPa is subjected to fluctuating torque, which varies from 400 Nm cw to 100 Nm ccw. The surface finish factor is 0.8. The reliability factor is 0.897. Size factor is 0.85 & factor of safety is 2. Find diameter of shaft using maximum distortion energy theory. **[12]**

<div align="center">OR</div>

Q8) a) Explain the procedure for design of components subjected to fluctuating stresses for infinite life using Goodman, soderberg & Gerber criterion.**[6]**

b) A bolted assembly is subjected to an external force which varies from o to 15KN. The combined stiffness of connected members and gasket is three times the stiffness of bolt. The initial tension in the bolt is 25% more than that required to avoid separation of connected members. The bolt has ultimate strength of 630 MPa and yield strength of 360 MPa. Fatigue stress concentration factor is 2.6 surface finish factor, size factor & reliability factors are 0.74, 0.85, 0.879 respectively. If the factor of safety is 2 find the size of bolt using modified goodman diagram. **[12]**

Q9) a) Explain Johnson's method for optimum design with an example. **[6]**

b) Design a tersile bar of length L = 200 mm to carry a tensile load of 5kN for minimum cost out of the following materials. Take factor of safety as 2.

Material	Mass density Kg/m³	Material cost (RS/N)	Yield strength (MPa)
Steel	7500	16	130
Aluminium alloy	3000	32	50
Titanium alloy	4800	480	90
Magnesium alloy	2100	32	20

[10]

OR

Q10) a) Prove that optimisation in power transmitted by a spur gear occur when the tangential force is equal to the dynamic load when the criterion for failure is scoring. Assume dynamic load to be directly proportional to the pinion speed. **[6]**

b) Derive the expression between the maximum and minimum force acting on a spring for minimisation of the spring weight. **[10]**

Q11) a) Explain the classification of material handling equipment. **[6]**

b) A flat horizontal belt conveyor is used for transporting crushed rock having mass density of 2 t/m³. The belt is 800 mm wide and has a speed of 1.75 m/s. Determine the capacity of the conveyor in tph. The surcharge angle is 25°. **[10]**

OR

Q12) a) Explain and sketch the arrangement of typical belt conveyor. **[6]**

b) Write a note on conveyor belt sag with a sketch. **[10]**

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P523

[4064] - 50-A

B.E. (Mech. S/W)

MACHINE TOOL DESIGN

(2003 Course) (402065) (Sem. - II) (Elective - II)

Time : 3 Hours]   *[Max. Marks :100*

Instructions to the candidates:

1) *Answer any three questions from each section.*

2) *Answers to the two sections should be written in separate books.*

3) *Neat diagrams must be drawn wherever necessary.*

4) *Figures to the right indicate full marks.*

5) *Assume suitable data, if necessary.*

SECTION - I

Unit - I

Q1) a) Discuss the recent trends in Machine Tool Design with respect to **[10]**

   i)   Operating speed range

   ii) Accuracy

   iii) Control systems

b) Explain PIV drive with block diagram. **[8]**

OR

Q2) a) Explain construction and working of Norton gear box. **[10]**

b) Discuss design considerations of speed regulation in cone variator. **[8]**

Unit - II

Q3) Design a three Stage 12 speed gear box transmitting 7.5 KW power with Speeds from 80 rpm to 1000 rpm. The minimum number of teeth on gear 17. Electric motor speed is 1440 rpm. Draw structural diagram and also Calculate number of teeth on gears. **[16]**

OR

Q4) a) Discuss design of Feed gear box in detail. Also state its features. **[8]**

b) State different progressions used in designing gear box with applications. **[8]**

Unit - III

Q5) a) What is static and dynamic stiffness? What is their effect on selection of Material for slideways? **[8]**

b) Discuss various types of lubrication systems for beds & slideways. **[8]**

OR

Q6) a) Describe various methods used for compensation of wear of guides. **[8]**

b) Describe stick-slip sliding. Explain its remedies. **[8]**

SECTION - II

Unit - IV

Q7) a) What is the importance of power screws in machine tools? Discuss design factors to be considered while designing. **[10]**

i) Sliding friction power screws

ii) Rolling friction power screws

b) Explain how the optimum spacing between spindle supports is determined while designing the machine tool spindles. **[8]**

OR

Q8) a) Describe working of a ball recirculating power screws. Explain how preloading is carried out in ball screws. **[10]**

b) Discuss design considerations for spindle unit of machine tool. **[8]**

Unit - V

Q9) a) What is adaptive control system? How it is used in recent machine tools. **[8]**

b) Explain principle and working of Electric braking system in machine tools. **[8]**

OR

*Q10)*a)   Explain hydraulic system used in shaper.   **[8]**

   b)   Explain hydraulic system used for chuck clamping in machine tools. **[8]**

Unit - VI

*Q11)*a)   State and discuss design features of NC and CNC machines.   **[8]**

   b)   Explain part programming of CNC machines.   **[8]**

<div align="center">OR</div>

*Q12)*a)   Discuss types of ATC (Automatic Tool Changer).   **[8]**

   b)   Explain Closed loop system of CNC machine in details.   **[8]**

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[4064] - 57

P524

B.E. (Production/Production S/W)

PLANT ENGINEERING & MAINTENANCE

(Sem. - I) (2003 Course) (411085) (Elective - I)

Time : 3 Hours]   *[Max. Marks :100*

Instructions to the candidates:

1) *Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6. from Section - I and Q.7 or Q.8, Q.9 or Q.10, Q.11 or Q.12. From Section - II*

2) *Answers to the two sections should be written in separate books.*

3) *Neat diagrams must be drawn wherever necessary.*

4) *Figures to the right indicate full marks.*

5) *Assume suitable data, if necessary.*

6) *Use of logarithmic tables, slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.*

SECTION - I

Unit - I

Q1) a) What factors will be consider for the site selection for following industries
   i) Automobile Industry

   ii) Cement Industry

   iii) Consumable durable industry like television manufacturing unit

   iv) Automobile (Car) manufacturing unit. **[10]**

   b) What are the Primary and Secondary functions of plant engineering?**[8]**

OR

Q2) a) In your opinion which aspect should be covered by a Plant Engg, Department in a manufacturing unit? **[8]**

   b) Environmental & Ecological aspects are assuming growing importance while making decision on plant location. Explain and illustrate with suitable examples. **[10]**

Unit - II

Q3) a) Write short notes on : **[8]**

   i) CRAFT   ii) CORELAP

   b) What is the use of REL chart? How is it prepared? **[8]**

<p align="center">OR</p>

Q4) a) Discuss in brief main steps involved in Systematic Layout Planning? **[8]**

   b) Explain in short various accident prevention practices. **[8]**

Unit - III

Q5) a) Write and explain any Eight principle of material handling in short. **[8]**

   b) Explain in short "how to estimate capacity for following auxiliary services"
   i) Transportation service
   ii) Water supply

   [8]

<p align="center">OR</p>

Q6) a) Briefly explain two disposal methods of solid waste. **[8]**

   b) Explain the importance of auxiliary services while finalizing the plant layout. **[8]**

SECTION - II
Unit - IV

Q7) a) What should be the objective of maintenance management for successful working of a maintenance department? **[8]**

   b) Explain in detail condition based maintenance. **[8]**

<p align="center">OR</p>

Q8) a) Briefly describe the maintenance information system used for maintenance functions. **[8]**

   b) Write short notes on : **[8]**
   i) History cards for equipments.
   ii) Maintenance manual records.

Unit - V

Q9) a) How the chemical effects be useful in assessing the condition of equipment? Explain briefly? **[8]**

b) Discuss the factors which need to be considered for implementation of an efficient Spare Parts control system? **[8]**

OR

Q10) a) Discuss in detail the importance of lubricants in the context of the maintenance function? **[8]**

b) Differentiate between the Spectrometric Oil analysis procedure and the magnetic plug inspection system. **[8]**

Unit - VI

Q11) a) What is reliability? Discuss various reliability models used in practice for maintenance of equipments? **[10]**

b) Explain the term Failure Mode & Effect Analysis in detail? What are the effects of failure? **[8]**

OR

Q12) a) Explain how computers can be helpful in discharge of maintenance functions. **[10]**

b) Write short notes on : **[8]**

   i) Reliability centered maintenance (RCM)

   ii) Total Productive Maintenance (TPM)

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P525

[4064] - 85

B.E. (Electrical)

ROBOTICS & AUTOMATION

(Sem. - I) (2003 Course) (403143) (Elective - I)

Time : 3 Hours]　　　　　　　　　　　　　　　　　*[Max. Marks :100*

Instructions to the candidates:

1) *Answers to the two sections should be written in separate books.*

2) *Neat diagrams must be drawn wherever necessary.*

3) *Figures to the right indicate full marks.*

4) *Your answers will be valued as a whole.*

SECTION - I

Q1) a) Compare interfacing of computer & printer with that of computer & a CNC. **[8]**

　　 b) What is a 'work envelop' of a Robot? Explain with an example & a neat diagram. **[8]**

OR

Q2) a) Explain how NC & CNC machines are different than robot. **[8]**

　　 b) Write the RIA definition of 'Robot' and explain clearly the operational features of industrial robots, that make them different from fixed automation. **[8]**

Q3) a) Write short notes on various types of joints & links used for robots.**[8]**

　　 b) Give Robot classification according to co-ordinate system. Explain in detail. **[8]**

OR

Q4) a) Differentiate point to point motion and continuous path motion hence explain trajectory planning. **[8]**

　　 b) Explain SCARA Robot. **[8]**

Q5) a) Write effects of pre-and post multiplication of Transformations. **[9]**

b) Two points a = (4 3 2)^T and b = (6 2 4)^T are to be translated a distance + 4 units along y axis and −3 units along 2 axis. Use Homogeneous transformation to find new points. **[9]**

<div align="center">OR</div>

Q6) Write short notes on : **[18]**

a) Singularities in Euler angles.

b) Homogeneous co-ordinate.

c) Concept of Homogeneous transformation.

<div align="center">

SECTION - II

</div>

Q7) a) In 3R Robotic arm, the shoulder joint is arranged on the axis of a rotary base and the axis of rotation of shoulder and Elbow joints are parallel to each other. D4 - parameter table for the arm is given below.

Link	a	α	d	θ
1	0	90°	0	θ_1
2	a_2	0	0	θ_2
3	a_3	0	0	θ_3

Draw the diagram showing the link co-ordinate system. **[9]**

b) Explain D-H parameters and derive the expression which relates two consecutive co-ordinate frames with the help of neat sketch. **[9]**

<div align="center">OR</div>

Q8) a) Enlist Rules for establishing link co-ordinate frame. **[9]**

b) Write short notes on Inverse solution by direct approach. **[9]**

Q9) a) Explain equation of motion using KE & PE. **[8]**

b) Derive the Euler-Lagrange equation for Robot dynamic. **[8]**

<div align="center">OR</div>

Q10) a) Compair Newton method & Lagrange method for Robot dynamics.**[8]**

b) Derive the following non conservative force equation using Lagrange method. **[8]**

$$F_i = \frac{\delta}{\delta t}\left(\frac{\delta L}{\delta q_i}\right) - \frac{\delta L}{\delta q_i}$$

Q11) a) Explain in detail about joint position control and Resolved motion position control. **[8]**

   b) Explain use of Robot in welding application as per specification, motor selection and motion control. **[8]**

<div align="center">OR</div>

Q12) a) Explain Resolved motion position control RMPC. **[8]**

   b) Write short notes on concept of linear and angular velocity. **[8]**

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P526

[4064] - 86

B.E. (Electrical)

POWER QUALITY

(Sem. - I) (2003 Course) (403143) (Elective - I)

Time : 3 Hours]   *[Max. Marks :100*

Instructions to the candidates:

 1) *In section I, attempt Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6. In section II, attempt Q.7 or Q.8, Q.9 or Q.10, Q.11 or Q.12.*

 2) *Answers to the two sections should be written in separate answer books.*

 3) *Figures to the right indicate full marks.*

 4) *Neat diagrams must be drawn wherever necessary.*

 5) *Use of non-programmable electronic pocket calculator is allowed.*

 6) *Assume suitable data, if necessary.*

SECTION - I

Q1) a) Define and explain various power quality terms as per IEEE Std. 1159.**[12]**

 b) Explain objectives of grounding. **[6]**

OR

Q2) a) Explain various grounding practices as per IEEE standard for better operation of electronic equipments. **[10]**

 b) Explain various definitions of power quality with reference to each stake holders. **[8]**

Q3) a) Explain various causes of overvoltage. Suggest various mitigation measures. **[8]**

 b) What are the various causes of voltage flicker and explain their effects on power system equipments. **[8]**

OR

Q4) a) What are the various devices used for voltage regulations? Explain. **[8]**

 b) Explain various means to reduce voltage flicker. **[8]**

Q5) a) Differentiate between voltage sags and voltage interruptions. What are the major causes of voltage sags? **[8]**

b) Explain voltage sag characteristics such as magnitude, duration, phase angle jump and missing voltage. **[8]**

OR

Q6) a) Explain area of vulnerability and critical distance as well as procedure to determine area of vulnerability. **[8]**

b) Explain procedure of assessment of equipment sensitivity to voltage sags and CBEMA curve. **[8]**

SECTION - II

Q7) a) Explain voltage Vs current distortion and various A.C. quantities under non-sinusoidal conditions. **[8]**

b) Explain step by step procedure for harmonics analysis. **[10]**

OR

Q8) a) What is harmonic filtering? Explain active and passive filters. **[8]**

b) Explain various harmonic indices and procedure to conduct harmonic study as per IEEE 519-1992 standard. **[10]**

Q9) a) Explain in details the sources and effects of oscillatory and impulsive transients on power system operation. **[8]**

b) Explain various computer tools used for transient's analysis. **[8]**

OR

Q10) a) What are the various load switching transients problems? Explain. **[10]**

b) Explain basic principals of overvoltage protection. **[6]**

Q11) a) Explain need of power quality monitoring. What is reactive and proactive approach? **[8]**

b) What are various techniques of data collection and analysis related to power quality problems? Explain. **[8]**

<div align="center">OR</div>

Q12) a) Explain procedure for monitoring power quality as per IEEE standard with reference to **[8]**

    i)   Connection of power quality monitor.

    ii)   Monitoring location.

    iii) Monitoring Period.

  b) Explain selection procedure of transducers and various transducers used during power quality monitoring. **[8]**

<div align="center">✪ ✧ ✪ ✧</div>

[4064] - 195

P535

B.E. (Chemical)
COMPUTER AIDED PROCESS CONTROL
(2003 Course) (Elective - II) (Sem. - II) (409348)

Time : 3 Hours]   *[Max. Marks :100*

Instructions to the candidates:

1) *Answer three questions from section I and three questions from section II.*
2) *Neat diagrams must be drawn wherever necessary.*
3) *Figures to the right indicate full marks.*
4) *Use of logarithmic tables, slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.*
5) *Assume suitable data, if necessary.*

SECTION - I

Q1) a) Explain control of batch and continuous processes. **[10]**

b) Describe computer control system with the help of suitable block diagram. **[8]**

OR

Q2) Explain the following computer aided process control architectures: **[18]**

a) Centralised

b) Distributed

c) Heirarchical

Q3) a) Explain distinguishing features of MIMO systems as compared to SISO systems. Give suitable examples. **[8]**

b) For a 2 × 2 system, define RGA state the properties of RGA and state the rules for determining input-output interactions. **[8]**

OR

Q4) For a closed - loop system modeled as [16]

$$\dot{X} = AX + BU$$
$$Y = CX$$

where $A = \begin{bmatrix} -1 & 0 & 3 \\ 2 & -1 & -1 \\ -3 & 1 & -2 \end{bmatrix}$, $B = \begin{bmatrix} 1 \\ 0 \\ 0 \end{bmatrix}$, $C = \begin{bmatrix} 1 & 2 & 1 \end{bmatrix}$

Test a) Controllability

b) Observability

Q5) a) What are hold elements in digital control systems? Explain the ZOH & FOH elements. [8]

b) State continuous - time domain transfer function of a classical PID - controller. Derive the discrete - time equivalence of this transfer function in position form and velocity form. [8]

OR

Q6) a) State analytical and graphical conditions for stability of discrete time systems. Indicate stable regions in s-plane & z-plane. [8]

b) Starting from the difference equation model, derive the transfer function of a first - order discrete time systems. Hence derive the unit step response of the system. [8]

SECTION - II

Q7) Explain organisation of a general purpose computer with the help of a block diagram of computer showing basic parts - control unit, ALU, memory, I/O devices. [16]

OR

Q8) Explain the following process - related interfaces- [16]

a) Analog interfaces – ADC, DAC, MUX

b) Digital interfaces

c) Pulse interfaces

d) RTC

Q9) a) Explain communication herirarchy in computer - aided control systems.

[8]

b) Explain ISO reference model used for networking of computers in a plant. **[8]**

<p style="text-align:center">OR</p>

Q10) a) Explain the data transfer techniques - polling and interrupt. **[8]**

b) Explain basic parts of process control software. **[8]**

Q11) Write short notes on the following. **[18]**

a) P.C. based data acquisition system

b) DLS displays

c) DCS software configuration

<p style="text-align:center">OR</p>

Q12) Write short notes on the following. **[18]**

a) PLC architecture

b) Ladder diagram programming

c) Microcontroller

<p style="text-align:center">❊ ❊ ❊</p>

P536

[4064] - 210

B.E. (Petroleum)
OILWELL DRILLING ENGINEERING
(2003 Course) (Sem. - II) (412390)

Time : 3 Hours]   *[Max. Marks :100*

Instructions to the candidates:

1) *Question nos. 1 and 5 are compulsory. Out of the remaining attempt two questions from section I and two questions from section II.*
2) *Answers to the two sections should be written in separate books.*
3) *Neat diagrams must be drawn wherever necessary.*
4) *Figures to the right indicate full marks.*
5) *Use of logarithmic tables, slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.*
6) *Assume suitable data, if necessary.*

SECTION - I

Q1) a) What are different steps involved in preparation of G.T.O.   **[9]**

b) Discuss ton mile calculations and its importance in drilling operations. **[9]**

Q2) a) How many drill collar should be run if maximum weight on Bit is anticipated 19 tonne, the average drill collar length is 9.2 m, drill collar weight is 0.218 tonne/mtr, the buoyancy factor is 0.847, well is vertical. AV. weight Drill collar = 251.5 kg/m.   **[4]**

b) Draw circulation system of a drilling rig Discuss different pressure losses during circulation & use of optimum hydraulics.   **[12]**

Q3) a) Explain geometrical planning of Type I well in directional well.   **[8]**

b) Using following data find length of L80 casing in a deviated well.   **[8]**

Kick off depth = 1000 ft.

Along hole depth = 7348 ft

Deviation = 35°,

Vertical depth	Grade
0 – 2400 ft	L 80
2400 – 4900 ft	K 55
4900 – 6200 ft	L 80

P.T.O.

Q4) Write short note: **[16]**
    a) MWD tool   b) Deflection tools
    c) Section modulus   d) Margin of overpull (MOP)

SECTION - II

Q5) Discuss driller's method of well control in detail. Calculate **[18]**
    a) Kill mud weight   b) ICP
    c) FCP   d) Surface to bit stroke
    e) Bit to surface stroke

Data given

       SIDP = 500 psi   SICP = 600 psi

    Original mud weight = 12ppg   Depth = 8000 ft

    Pump output = 0.11g bbl/stroke

    Drill pipe capacity = 0.0176 bbls/ft

    Drill pipe × openhole capacity = 0.1215 bbls/ft

    KRP at 30 spm = 100 psi

Q6) a) Discuss different types of offshore rigs in detail. **[8]**
      b) BOP hydraulic control unit. **[8]**

Q7) a) Describe in detail casing seat selection procedure. **[8]**
      b) Explain Leak - off - Test and calculate maximum allowable surface pressure if casing shoe depth at 9000 ft Leak of test pressure 1500 psi at 11 ppg mud density increased to 12 ppg while drilling 12,000 ft. **[8]**

Q8) Write notes on **[16]**
    a) Abnormal pressure generation
    b) D - exponent
    c) Casing design considerations
    d) Different causes & symptoms of kick.

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B.E. (Petroleum)

DEEPWATER TECHNOLOGY

(2003 Course) (Elective - II) (Sem. - II) (412391)

Time : 3 Hours]   *[Max. Marks :100*

Instructions to the candidates:

1) *Question nos. 1 and 5 are compulsory. Out of the remaining attempt 2 questions from section I and 2 questions from section II.*

2) *Answers to the two sections should be written in separate books.*

3) *Neat diagrams must be drawn wherever necessary.*

4) *Figures to the right indicate full marks.*

5) *Use of logarithmic tables, slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.*

6) *Assume suitable data, if necessary.*

SECTION - I

Q1) a) Discuss different offshore rigs and floating drilling vessels with suitable sketch.   **[9]**

b) What are different methods of station keeping? Discuss any one in detail. **[9]**

Q2) a) Discuss deep water drilling riser system and its components in detail.**[10]**

b) Heave compensator working principle in brief.   **[6]**

Q3) a) Discuss different environmental forces acting on offshore structures. **[8]**

b) Discuss mud policy used in high pressure and high temperature wells.**[8]**

Q4) Write short notes :   **[16]**

a) Meta center.

b) Subsea BOP stack.

SECTION - II

Q5) a) Discuss different types of offshore platforms in detail. **[12]**

b) Discuss different subsea tree and selection. **[6]**

Q6) a) Oil & gas separator design considerations; stage separation in detail.**[8]**

b) Discuss any one EOR Technique in detail. **[8]**

Q7) a) Subsea oil & gas line design, construction, and installation in brief. **[8]**

b) Discuss logistic considerations in exploration drilling and production to eaze the operations. **[8]**

Q8) Short notes on : **[16]**

a) Offshore storage

b) Offshore field development & planning.

c) HSE policy.

d) Stimulation.

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B.E. (Polymer)

RUBBER TECHNOLOGY

(Sem. - I) (2003 Course) (409366) (Elective - I)

Time : 3 Hours]						*[Max. Marks :100*

Instructions to the candidates:

1) *Answer any three questions from each section.*

2) *Answers to the two sections should be written in separate answer books.*

3) *Neat diagrams must be drawn wherever necessary.*

4) *Figures to the right indicate full marks.*

5) *Use of logarithmic tables, slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.*

6) *Assume suitable data, if necessary.*

SECTION - I

Q1) a) Explain rubber elasticity on the basis of kinetic theory and thermodynamics. **[8]**

b) What are the molecular structure requirements for a material to act as a rubber. **[8]**

OR

Q2) a) Write a short note on swelling of rubbers by liquids. What influence does fillers have on swelling of rubbers? **[8]**

b) Explain the various stages involved in latex technology. **[8]**

Q3) a) Describe the role of the following additives in a rubber formulation.

 i) Vulcanising system

 ii) Peptisers **[6]**

b) Differentiate between the types of C-blacks. **[6]**

c) Discuss the use of fabrics in conjunction with rubbers. **[4]**

OR

Q4) a) Explain in detail soluble and non-soluble sulphur as a vulcanising agent.**[4]**

b) Which are the vulcanising systems used with the following rubber. Give reactions to show the vulcanisation.

i) Neoprene ii) Silicone Rubbers iii) Natural Rubber **[6]**

c) Explain the need of addition mechanism of functioning & one example of the following additives.

i) Tackifiers ii) Antioxidants. **[6]**

Q5) a) What is vulcanisation? What are the factors affecting the rate of vulcanisation? **[6]**

b) State the principles of a compounding. **[6]**

c) State the different types of machinery used for compounding of rubbers. Explain in detail the design of a Banbury Mixer. **[6]**

OR

Q6) a) Classify rubber materials into suitable groups. **[6]**

b) What is mastication? How is it done? Discuss mastication of natural rubber with the help of a mastication curve. **[6]**

c) Define "compounding". List the various ingredients of a rubber compound. Give the role of each with suitable examples. **[6]**

SECTION - II

Q7) a) Explain the process of injection molding of rubbers. Give its advantages and disadvantages. **[8]**

b) How is vulcanisation of rubber extrudates carried out? **[4]**

c) Discuss "ram extruders" used w.r.t rubbers. **[4]**

OR

Q8) a) Why does roll deflection occur in case of calendar rolls? Explain different ways to overcome this problem. **[8]**

b) Write a short note on compression molding w.r.t rubbers. **[8]**

Q9) a) Differentiate between radial and crossply tyres. **[6]**

b) Explain the various steps in the making of a conveyer belt. **[6]**

c) Explain the construction of a rubber hose with a neat sketch. Explain the purpose and formulation of the different layers. **[6]**

OR

Q10) a) Explain the straight dipping method for manufacture of rubber gloves.**[6]**

b) Define the term "cellular rubbers". Classify cellular rubbers & explain.**[6]**

c) With a neat sketch explain the major components of a cable. **[6]**

Q11) a) Which are the electrical tests carried out on rubbers intended for use in cables? Explain any 2 tests. **[6]**

b) What is "compression set"? Explain the procedure to find the compression set in tension. **[6]**

c) Draw and explain the cure curve for rubbers. **[4]**

OR

Q12) a) List the various tests carried out on unvulcanised rubbers. Explain any 2 in detail. **[6]**

b) What is "rebound resilience"? How is the test carried out? **[6]**

c) What is the need of testing of rubbers? How are the test specimens prepared? **[4]**

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B.E. (Polymer Engg.)

PRODUCT DESIGN AND COMPUTER APPLICATIONS

(2003 Course) (Sem. - II) (409368)

Time : 3 Hours]   *[Max. Marks :100*

Instructions to the candidates:

1) *Attempt question No. 1 or 2, 3 or 4 and 5 or 6 from section I. Attempt question number 7 from section II.*

2) *Answers to the two sections must be written in separate answer books.*

3) *Use of scientific calculator, log-log paper is allowed.*

4) *Figures to the right indicate full marks.*

5) *Assume suitable data, if necessary.*

SECTION - I

Q1) a)   Discuss Eyring-Prandtl model and also discuss modification of above model given by Eyring-Powell model. Discuss merits and demerits of both models.   **[7]**

b)   Discuss the use of equivalent radius or substitute radius given by Schenkel in pressure drop calculations.   **[4]**

c)   Explain the principle of runner balancing with a suitable example.   **[5]**

Q2) a)   Discuss in short why gating from thick to thin section is a good practice and explain how internal runner helps when gating from thin to thick.**[6]**

b)   Write in short about linear mould shrinkage.   **[5]**

c)   Melt flows through a slit width w = 50 mm, height h = 5 mm & length l = 50 mm. The mass flow rate is 25 gm/sec. Take melt density as 0.78 gms/cm³. If power law of the form

$$\tau = 1,25,000 \; \dot{r}_a^{0.5} \text{ is used, calculate pressure drop.}$$

τ is in N/m^2 and $\dot{r}_a$ is in sec^{-1}.   **[5]**

Q3) a)   Write in short about design considerations for ribs and corner radii given in plastic product design.   **[5]**

b) Draw neat sketches of self locking cantilever snap fit assembly used in plastic product design and discuss design features. **[5]**

c) A unidirectional lamina has following engineering properties

E_{11} = 140 GPa E_{22} = 10 GPa

G_{12} = 6 GPa υ_{12} = 0.3

If stress of 100 MPa is applied at 20° to fiber direction, find whether failure takes place as per maximum strain criteria

Given

limiting tensile strain in 1 - direction = 2×10^{-3}

limiting tensile strain in 2 direction = 0.5×10^{-3}

limiting compressive strain in 1 - direction = 0.0125×10^{-3}

limiting compressive strain in 2 direction = $.02 \times 10^{-5}$

limiting shear strain (1-2 plane) = 0.01. **[8]**

Q4) a) Prove that reduced transformed stiffness $[\overline{Q}]$ matrix for orthotropic material is given by

$$[\overline{Q}] = [T]^{-1} [Q] [T]^{-T}$$

[T] = Transformation matrix

[Q] = Reduced stiffness matrix **[6]**

b) A stress of 10 MPa is applied at 60° to the fiber direction. Calculate stresses and strains in principal material directions. Given engineering constants with usual notations - for above unidirectional lamina are :

E_{11} = 22 GPa E_{22} = 9.9 GPa υ_{12} = 0.4 G_{12} = 5 GPa **[6]**

c) Obtain an expression for forth order strength tensor of Tsai - Wu failure criteria using hydrostatic pressure test. **[6]**

Q5) a) A cylindrical vessel with outside diameter of 40 mm and inside diameter of 24 mm has a radial crack of 3.5 mm deep on the outside surface. If the vessel is made from polystyrene which has critical stress intensity factor of 1 MN/m², calculate the maximum permissible pressure in the vessel. **[8]**

b) A piece of thin wall PP pipe with diameter 300 mm is rotated about its longitudinal axis at a speed of 3000 rev./min., calculate how long it will take for the diameter of the pipe to increase by 1.2 mm. The density of PP is 909 kg/m³. Use the creep curve given in fig.1 **[8]**
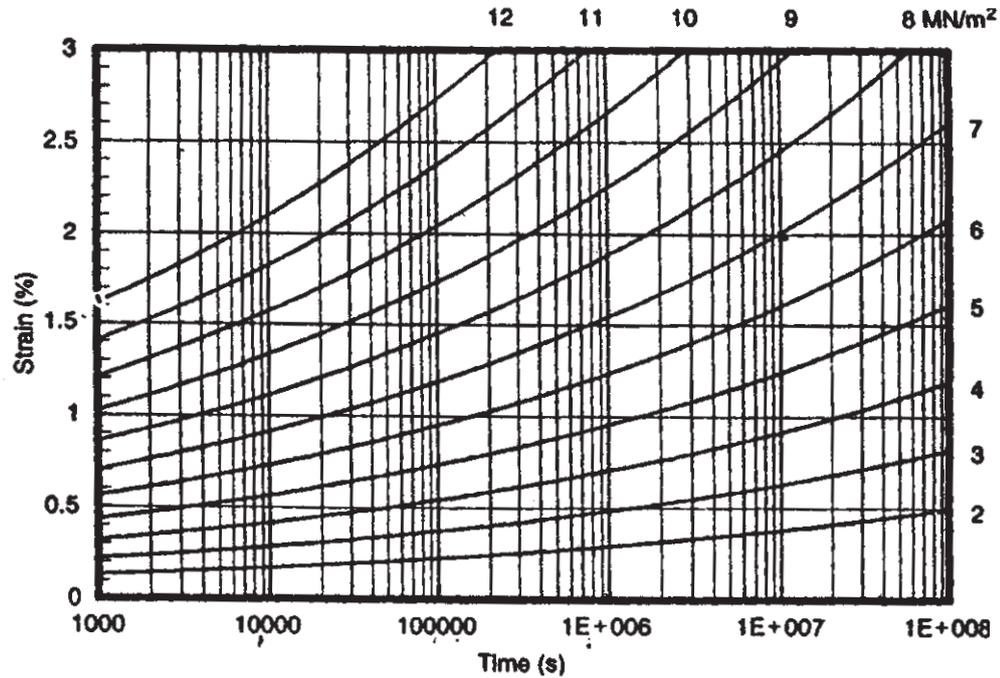
Creep curves for polypropylene at 20°C (density 909 kg/m³)

Fig 1

Q6) a) Using energy approach to fracture, obtain expression for critical strain energy release rate. **[10]**

b) Write in short about time - temperature superposition. **[6]**

SECTION - II

Q7) a) Design and draw a multi-impression injection mould for the article shown in fig No. 2 or fig No. 3. Draw at least two views to bring out features of

i) Ejection system

ii) Cooling system

iii) mechanism of thread withdrawal and split mechanism.

If required, draw additional views. Give overall dimensions of the mould.

[40]

b) For the design made for the article as shown in fig 2 or fig 3

   i) Justify the material used for core, cavity back up plates and other important mould parts.

   ii) Give design calculations for threaded withdrawal and split movement.

[10]
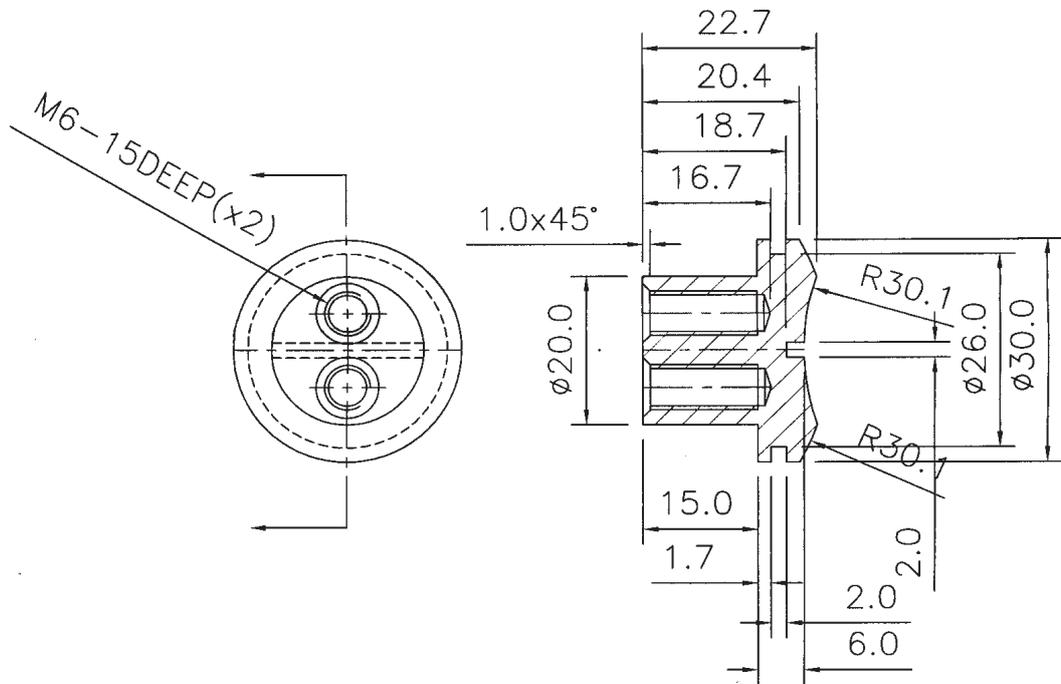
Notes : 1) All dimensions are in mm.
2) Assume suitable draft.
3) Material : HIPS
4) Shrinkage factor = 0.5%

Fig 2

ACROSS FLAT

34.6

⌀50.0

⌀36.0

3.0

8.0

R5.0

30.0

50.0

14.0

M30.0—3.5 PITCH

40.0

ACROSS DIAGONAL
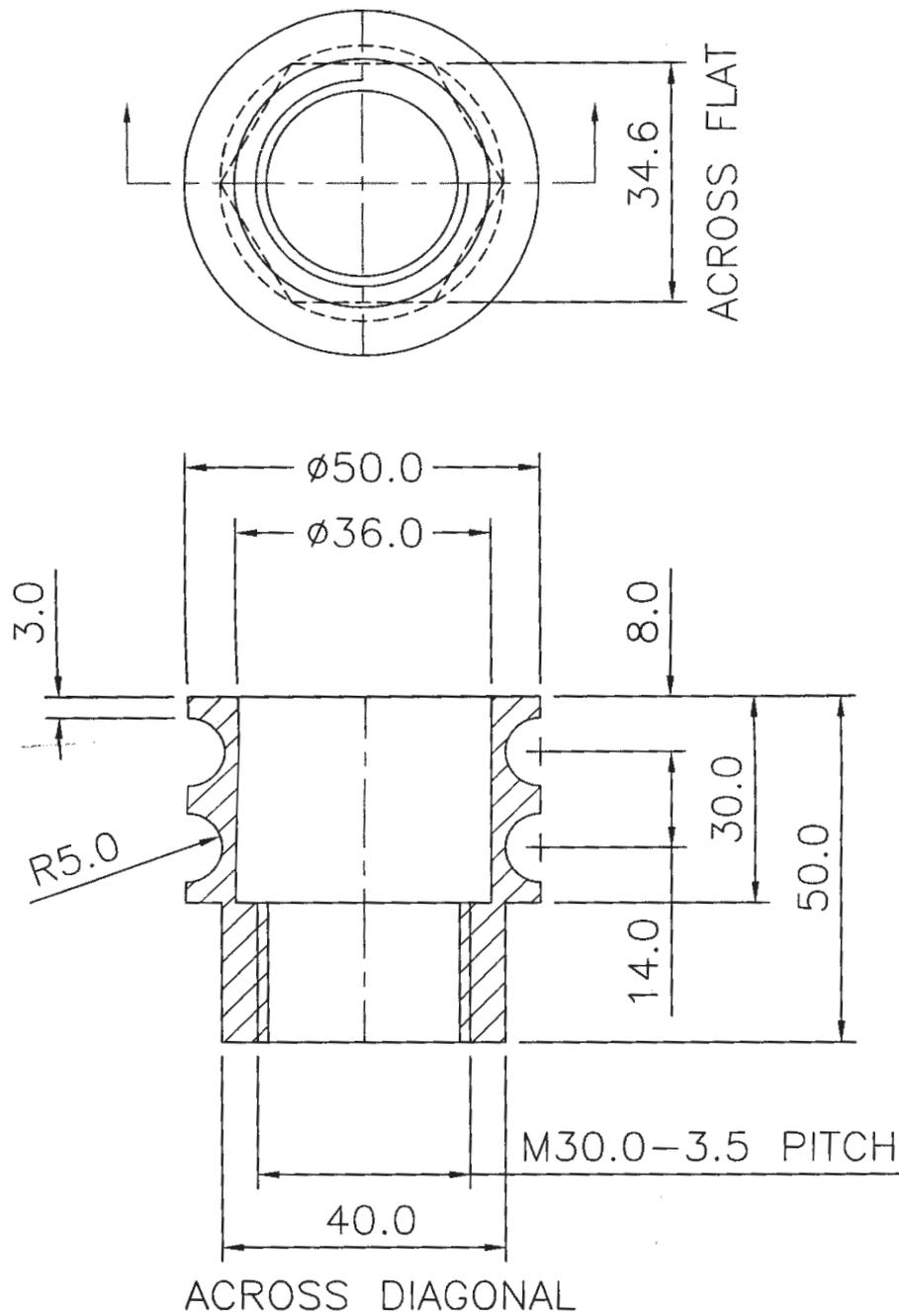
ALL DIMENSIONS ARE IN mm.
ASSUME SUITABLE DRAFT
MATERIAL : ABS
SHRINKAGE FACTOR : 0.5%

FIGURE 3

log4x4.ps

AutoCAD

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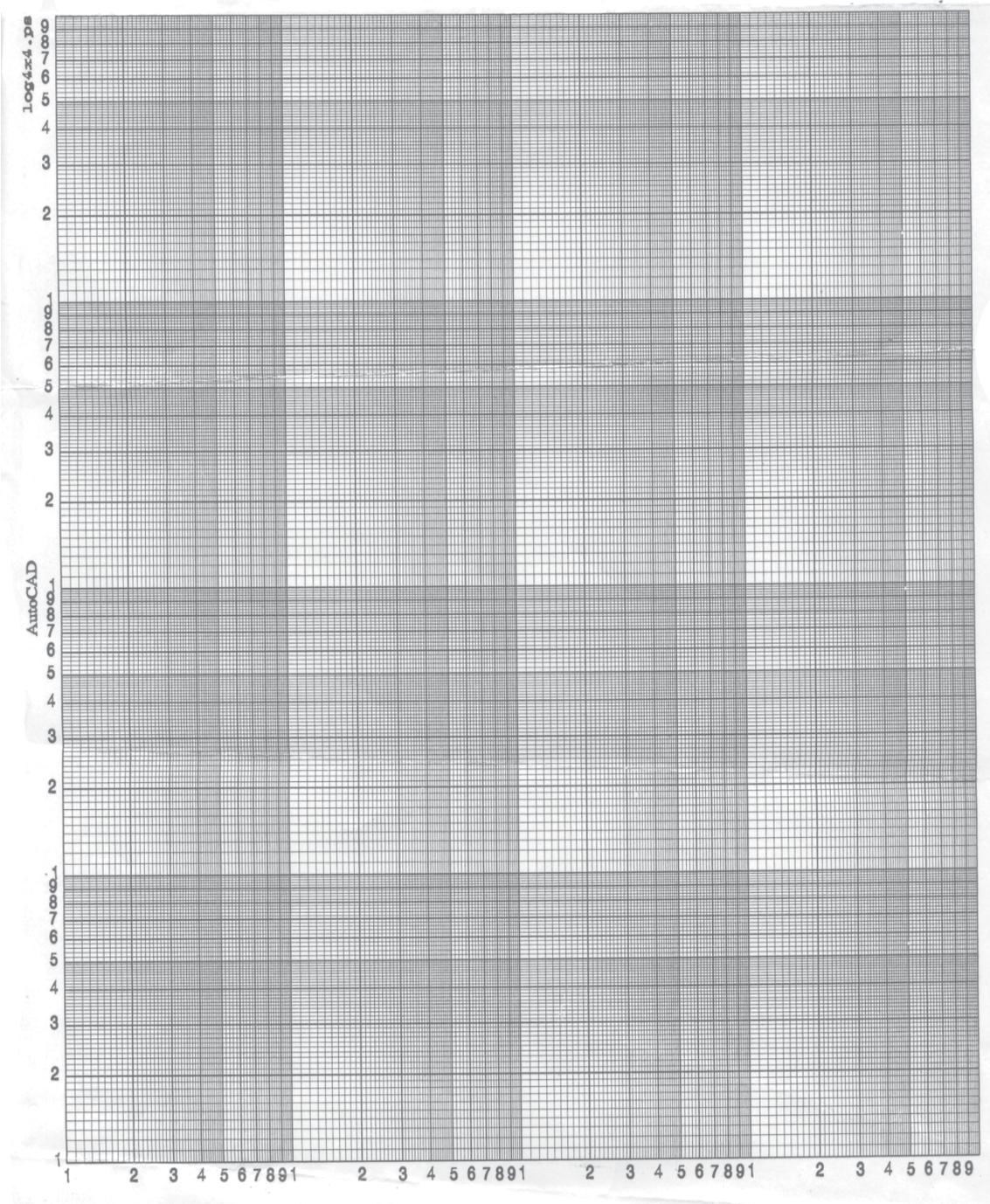
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B.E. (Polymer Engg.)

POLYMER PROCESSING OPERATIONS - II

(2003 Course) (Sem. - II) (409369)

Time : 3 Hours]   *[Max. Marks :100*

Instructions to the candidates:

1) *Attempt Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6 from section I. Attempt Q.7 or Q.8, Q.9 or Q.10, Q.11 or Q.12 from section II.*

2) *Figures to the right indicate full marks.*

3) *Answers to the two sections should be written in separate answer books.*

4) *Use of pocket calculator, log paper is allowed.*

5) *Assume suitable data, if required.*

SECTION - I

Q1) a) With neat sketches, explain different heating arrangements. Used in calendering plants. Explain also how temperature gradient or variation affects the product quality attributes. **[6]**

b) Obtain an expression for

  i) point of maximum pressure

  ii) output of the calendering process.

  Write assumptions made for the derivation. **[6]**

c) Draw neat sketches of superimposed roll arrangements. **[4]**

OR

Q2) a) Discuss the roll separation forces in calendering and also explain various methods to compensate for roll bending and roll deflection. **[8]**

b) Explain various additives used in compound used for calendered flooring sheets and explain the compounding as well as calendered line features.**[8]**

Q3) a) Explain general features of multilayer rotational moulding. Explain how the process is controlled in respect of **[6]**

  i) Addition of charge for different layers.

  ii) Control of heating cycles.

b) How different cooling methods/systems affect crystallisation in rotational moulding? Explain with examples. **[6]**

c) Explain merits of independent arm rotational moulding machine. Draw bar chart of cycle. **[6]**

OR

Q4) a) Explain influence of following parameters on bubble removal during rotational moulding process.

i) MFI or melt viscosity

ii) Powder characteristics **[6]**

b) With respect to rotational moulding of liquid polymers, explain the influence of processing conditions on the wall thickness uniformity and on bubble content of the moulded parts. **[8]**

c) Explain in short different nylons which can be rotation moulded and give processing temperature range for each type of nylon. **[4]**

Q5) a) Explain how thickness control is achieved in dip coating and slush moulding. **[6]**

b) Describe the process, material and applications of polymer casting. **[6]**

c) Explain the rainbow effect. **[4]**

OR

Q6) a) Explain different types of inks used in printing techniques meant for plastic products. **[8]**

b) Discuss hot stamping and embossing with reference the plastic products. **[8]**

SECTION - II

Q7) a) Discuss the significance of spinning speed for structure development in fiber material. **[8]**

b) Explain in detail the spinning technique used in poly (p - phenylene terephthalamide) fiber manufacture. **[10]**

OR

Q8) a) Compare between wet-spinning and dry spinning type of solution spinning technique. **[6]**

b) Enlist advantages of high speed spinning. **[4]**

c) Enlist various post spinning techniques. **[4]**

d) Explain the terms 'tenacity' and 'Denier' in case fibers. **[4]**

Q9) a) With neat sketches, explain the SPI code system used in plastics recycling. **[6]**

b) Write a short note on recycling of plastics via pyrolysis technique. **[10]**

OR

Q10) a) What do you understand by tertiary recycling of plastics. Explain any one in detail. **[10]**

b) Write a short note on biodegradable plastics. **[6]**

Q11) a) Discuss at least two difficulties faced with respect to drilling and turning / boring of plastics. Discuss the causes and remedial actions to remove the difficulties. **[8]**

b) Write in short about laser machining of plastics. **[8]**

OR

Q12) a) Write in short about twist-drill geometry and speed/feed recommendations with respect to at least two thermoplastics. **[4]**

b) Write short notes on (Any three) : **[12]**

i) Ultrasonic welding of plastics.

ii) Adhesive bonding of plastics.

iii) Self threading screws.

iv) Different types of bonded joints.

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[4064] - 464

B.E. (Electrical)
POWER QUALITY
(2008 Course) (Elective - I) (403143 (B)) (Sem. - I)

Time : 3 Hours]   *[Max. Marks :100*

Instructions to the candidates:

1) *In section I, attempt Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6. In section II, attempt Q.7 or Q. 8, Q.9 or Q.10,   Q.11 Q.12 .*
2) *Answers to the two sections should be written in separate answer books.*
3) *Figures to the right indicate full marks.*
4) *Neat diagrams must be drawn wherever necessary.*
5) *Use of non-programmable electronic pocket calculator is allowed.*
6) *Assume suitable data, if necessary.*

SECTION - I

Q1) a) Define and explain the following terms as per IEEE Std. 1159, such as : **[12]**

   i)   Long duration voltage variations

   ii)   Voltage swells

   iii) Voltage sags

   iv)   Voltage interruptions and

   v)   Voltage fluctuations.

   b) What are objectives of grounding? Explain different problems due to poor grounding. **[6]**

OR

Q2) a) Explain relation between Equipment compatibility, immunity, planning and emission levels. **[10]**

   b) Explain various definitions of power quality with reference to each stake holders and why power quality is gaining important now a day? **[8]**

Q3) a) Explain reactive power management concept. List the various devices used for voltage regulations. **[8]**

b) Explain the following terms related with voltage flicker **[8]**

   i) Short term (P_{st}) and

   ii) Long term(P_{lt}) voltage flicker.

<center>OR</center>

Q4) a) Explain various causes of overvoltage. Suggest various mitigation measures. **[8]**

b) What are the various causes of voltage flicker? What are it effects on load equipments? **[8]**

Q5) a) Explain voltage sag characteristics such as magnitude, duration, phase angle jump and missing voltage. **[8]**

b) Explain step by step procedure for assessment of equipments sensitivity to voltage sags. **[8]**

<center>OR</center>

Q6) a) Explain in detail economic impact of voltage sags. **[8]**

b) Explain influence of fault location and fault level on voltage sags and concept of area of vulnerability. **[8]**

<center>

SECTION - II

</center>

Q7) a) Define waveform distortion and explain causes as well as effects of harmonic on power system and load equipments. **[10]**

b) Explain various harmonics mitigation methods. **[8]**

<center>OR</center>

Q8) a) Explain harmonics series and parallel resonances. What are its consequences? **[8]**

b) Explain various harmonic indices and procedure to conduct harmonic study as per IEEE standard. **[10]**

Q9) a) Explain the sources and effects of transients on power system operation.

[10]

b) Explain mitigation methods of capacitive transients.

[6]

OR

Q10) a) Explain impulsive transients due to lightening and its sources.

[10]

b) Explain various devices used for overvoltage protection.

[6]

Q11) a) Explain procedure for selection of monitoring equipments and use of various equipments required for power quality monitoring.

[8]

b) Explain various transducers and its selection procedure for power quality monitoring.

[8]

OR

Q12) a) Explain various techniques of data collection and its analysis.

[8]

b) What are the different approaches followed in power quality monitoring? Explain.

[8]

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[4064] - 581

B.E. (Polymer Engineering)
PRODUCTION PLANNING AND CONTROL
(2008 Course) (Elective - II) (Sem. - I) (409365 (A))

Time : 3 Hours]   *[Max. Marks :100*

Instructions to the candidates:

1) *Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6 from section I. Answer Q.7 or Q. 8, Q.9 or Q.10, Q.11 or Q.12 from section II .*

2) *Figures to the right indicate full marks.*

3) *Answers to the two sections should be written in separate answer books.*

4) *Use of scientific calculator, log paper, statistical data sheet is allowed.*

5) *Assume suitable data, if required.*

SECTION - I

Q1) a) Seven jobs are to be processed on two machines A and B, in the order AB. Each machine can process only one job at a time. The processing time (in hours) are as follows: **[8]**

Job :	1	2	3	4	5	6	7
A :	10	12	13	7	14	5	16
B :	15	11	8	9	6	7	15

Find the optimal sequence to minimize the total elapsed time. Find also the idle time for each machine.

b) The following table gives the activities of a project and time duration. **[8]**

Activity :	A	B	C	D	E	F
Immediate Predecessors :	–	A	A	B,C	–	E
Duration (days) :	2	3	4	6	2	8

Draw the network, and calculate the total float and free float for each activity. Also determine the critical path and project duration.

OR

Q2) a) Find the sequence that minimises the total time required to perform the following jobs, on three machines A, B, C in the order ABC. Find the minimum elapsed time and also the idle time for each machine. **[8]**

Job :	1	2	3	4	5	6
A :	4	13	6	3	10	12
B :	9	7	5	7	4	2
C :	14	15	10	13	9	14

b) The time estimates of all activities of a project are given below: **[8]**

Activity	Estimated Duration (weeks):		
(i - j)	Optimistic	Mostlikely	Pessimistic
1 - 2	1	1	7
1 - 3	1	4	7
1 - 4	2	2	8
2 - 5	1	1	1
3 - 5	2	5	14
4 - 6	2	5	8
5 - 6	3	6	15

i) Construct the project network.

ii) Find the expected duration and standard deviation of each activity.

iii) Determine the critical path, expected project length and expected variance of project length.

iv) What is the probability that the project will be completed two months earlier than expected. given : $p(z \leq 1.61) = 0.9463$

Q3) a) Explain, with the aid of a neat diagram, the various characteristics of the EOQ model with constant rate of demand and without shortages. **[7]**

b) The demand for an item in a company is 18,000 units per year. The company can produce the item at a rate of 3000 per month. The cost of one set up is Rs. 500 and the holding cost per unit per month is Rs. 0.15. The shortage cost per unit is Rs. 20 per month. Determine the EOQ, maximum inventory level in the cycle, optimum cycle time and the optimal cost. **[9]**

OR

Q4) a) A certain item costs Rs. 235 per tonne. The monthly requirement is 5 tonnes, and each time the stock is replenished. The set up cost is Rs. 1000. The cost of carrying inventory has been estimated at 10% of the value of the stock per year. Find the optimal order quantity. How frequently should the orders be placed. **[7]**

b) The annual demand for a product is 6000 units. The cost of storage per unit per year is 18% of the unit cost. The ordering cost is Rs 600 for each order. The unit cost depends upon the quantity ordered. The price break for the range of quantity ordered is as follows: **[9]**

Quantity	Price per unit
$0 \leq Q_1 < 2000$	Rs. 20
$2000 \leq Q_2 < 4000$	Rs. 15
$4000 \leq Q_3$	Rs. 9

Find the optimal order quantity.

Q5) a) Discuss generalised double sampling plan and mention merits and demerits of the same. **[6]**

b) No of defectives in 15 samples of 100 each are given below. **[4]**

10, 15, 12, 11, 10, 9, 20, 15, 14, 13, 12, 11, 12, 10, 9

Using C-chart, explain whether process is under statistical control.

c) Weight consistency of injection moulded articles produced on a perticular machine is to be monitored using $\overline{X}$ chart. Twenty samples having sample size 4 were inspected and range/average of each sample was found to be - (weights in gm) **[8]**

Sample Mean	Sample Range	Sample Mean	Sample Range
1) 15.0	8	11) 13	15
2) 10.0	6	12) 13.5	9
3) 12.5	9	13) 11	12
4) 13	6	14) 13	9
5) 15	14	15) 15	10
6) 15	8	16) 11.5	10
7) 20	6	17) 10	10
8) 15	13	18) 11.5	10
9) 10	10	19) 14	12
10) 15	15	20) 10	12

Construct $\overline{X}$ chart. Comment whether process is under statistical control or not. If not, what action do you propose?

OR

Q6) a) For a sampling plan N = 1000, n = 60 and C = 1, determine the probability of acceptance of following lots **[8]**
  i)   0.5 % defective
  ii)   0.75 % defective
  iii)   1 % defective
  iv)   1.25 % defective
  v)   1.5 % defective
  vi)   2 % defective
  vii)   3 % defective
  viii) 5 % defective
  ix)   10 % defective
  Draw operating characteristic curve.

b) Explain what do you understand by process capability index C_p? **[5]**

c) Explain control chart for p (fraction defective) and mention the merits. **[5]**

SECTION - II

Q7) a) Solve the following transportation problem. **[8]**

Destination

		A	B	C	D	
	I	21	16	25	13	11
Source	II	17	18	14	23	13	Availability
	III	32	27	18	41	19
Requirement		6	10	12	15	43

b) A marketing manager has 5 salesmen and 5 sales districts. Considering the capabilities of the salesmen and the nature of districts, the marketing manager estimates that sales per month (in hundred rupees) for each salesman in each district would be as follows: **[8]**

Sales districts

		A	B	C	D	E
	1	32	38	40	28	40
Salesmen	2	40	24	28	21	36
	3	41	27	33	30	37
	4	22	38	41	36	36
	5	29	33	40	35	39

Find the assignment of salesmen to districts that will result in maximum sales.

OR

Q8) a) Four jobs are to be done on four different machines. The cost (in rupees) of producing i^{th} job on the jth machine is given below **[6]**

Machines

	M_1	M_2	M_3	M_4
J_1	15	11	13	15
J_2	17	12	12	13
J_3	14	15	10	14
J_4	16	13	11	17

Jobs

Assign the jobs to different machines so as to minimize the total cost.

b) A company has three cement factories located in cities 1, 2, 3 which supply cement to four projects located in towns 1, 2, 3, 4. Each plant can supply 6,1, 10 truck loads of cement daily respectively and the daily cement requirements of the projects are respectively 7, 5, 3, 2 truck loads. The transportation costs per truck load of cement (in hundreds of rupees) from each plant to each project site are as follows: **[10]**

Project sites

	1	2	3	4
1	2	3	11	7
2	1	0	6	1
3	5	8	15	9

Factories

Determine the optimal distribution for the company so as to minimize the total transportation cost.

Q9) a) A super market has a single cashier during peak hours. Customers arrive at a rate of 20 per hour. The average number of customers that can be processed by the cashier is 24 per hour. Calculate. **[8]**

i) The probability that the cashier is idle.

ii) The average number of customers in the queueing system.

iii) The average time a customer spends in the system.

iv) The average number of customers in the queue.

v) The average time a customer spends in the queue waiting for service.

b) There are 4 booking counters in a railway station. The arrival rate of customers follows Poisson distribution and it is 30 per hour. The service rate also follows poisson distribution and it is 10 customers per hour. Find. **[8]**

    i)   The probability that there are no customers in the system.

    ii)   The probability of having 3 customers in the system.

    iii) The probability of having 5 customers in the system.

OR

Q10) a) Show that the number of arrivals 'n' in a queue in time t follows the poisson distribution, stating the assumptions. **[8]**

    b) The arrival rate of break down machines follow poisson distribution with a mean 6 per hour. The service rate of machines by a maintenance mechanic also follows poisson distribution with a mean of 4 per hour. The down time cost per hour of a breakdown machine is Rs 300, and the labour cost is Rs 60. Determine the optimal number of maintenance mechanics to be employed to repair the machines such that the total cost is minimized. **[8]**

Q11) a) A TV dealer find that the cost of holding a TV in stock for a week is Rs. 50. Customers who cannot obtain new TVs immediately tend to go to other dealers and he estimates that for every customer who cannot get immediate delivery he loses an average of Rs. 200. For one particular model of TV, the probabilities of a demand of 0,1, 2, 3, 4 and 5, TVs in a week are 0.05, 0.10, 0.20, 0.30, 0.20 and 0.15 respectively. **[10]**

    i)   How many televisions per week should the dealer order? Assume that there is no time lag between ordering and delivery.

    ii)   Compute EVPI.

    b) i)   Define Competitive Game.

       ii)   Two person, Zero - sum games.

    Find the range of values of p and q which will render the entry (2, 2) a saddle point for the game.

    The payoff matrix of a game is given. Find the solution of the game to the player A and B. **[8]**

$$
\begin{array}{c}
& & \text{B} \\
& & \begin{array}{ccccc} \text{I} & \text{II} & \text{III} & \text{IV} & \text{V} \end{array} \\
\text{A}\begin{array}{c} \text{I} \\ \text{II} \\ \text{III} \\ \text{IV} \end{array} &
\begin{bmatrix}
-2 & 0 & 0 & 5 & 3 \\
3 & 2 & 1 & 2 & 2 \\
-4 & -3 & 0 & -2 & 6 \\
5 & 3 & -4 & 2 & -6
\end{bmatrix}
\end{array}
$$

OR

Q12) a) Raman Industries Ltd. has a new product which they expect has great potential. At the moment they have two courses of action open to them: $S_1 = T_0$ test the market, $S_2 = T_0$ drop the product. If they test it, it will cost Rs. 50,000 and the response could be positive or negative with probabilities of 0.70 and 0.30 respectively. If it is positive, they could either market it with full scale or drop the product. If they market it with full scale, then the result might be low, medium, or high demand and the respective net pay-offs would be - Rs. 1,00,000, Rs. 1,00,000 or Rs. 5,00,000. These out comes have probabilities of 0.25, 0.55 and 0.20 respectively. If the result of the test marketing is negative, they have decide to drop the product. If at any point, they drop the product there is a net gain of Rs. 25,000 from the sale of scrap. All financial values have been discounted to the present. **[9]**

Draw a decision tree for the problem and indicate the most preferred decision.

b) Solve (3×3) game by the simplex method of linear programming whose pay off matrix is given below. **[9]**

Player B

		1	2	3
	1	3	−1	−3
Player A	2	−3	3	−1
	3	−4	−3	3

XII, FACTORS USEFUL IN THE CONSTRUCTION OF CONTROL CHARTS

Sample size n	Mean-chart Factors for control limit			Factors for central line	Factors for control limits				Factors for central line	Range chart Factors for control limit			
	A	A1	A2	c2	B1	B2	B3	B4	d2	D1	D2	D3	D4
2	2.121	3.760	1.880	0.6642	0	1.843	0	3.267	1.128	0	3.686	0	3.267
3	1.732	2.394	1.023	0.7236	0	1.858	0	2.566	1.693	0	4.358	0	2.575
4	1.500	2.880	0.729	0.7979	0	1.808	0	2.269	2.059	0	4.698	0	2.282
5	1.342	1.596	0.577	0.8407	0	1.756	0	2.089	2.236	0	4.918	0	2.115
6	1.225	1.410	0.483	0.8686	0.026	1.711	0.030	1.970	2.534	0	5.078	0	2.004
7	1.134	1.277	0.419	0.8882	0.105	1.672	0.118	1.888	2.704	2.205	5.203	0.076	1.924
8	1.061	1.175	0.073	0.9027	0.167	1.638	0.185	1.815	2.847	0.387	5.307	0.136	1.864
9	1.000	1.094	0.037	0.9139	0.219	1.609	0.239	1.761	2.970	0.546	5.394	0.184	1.816
10	0.949	1.028	0.308	0.9227	0.262	1.584	0.284	1.716	3.078	0.687	5.469	0.223	1.777
11	0.905	0.973	0.285	0.9300	0.299	1.561	0.321	1.679	3.173	0.812	5.534	0.256	1.744
12	0.866	0.925	0.256	0.9359	0.331	1.541	0.354	1.646	3.258	0.924	5.592	0.284	1.716
13	0.832	0.883	0.249	0.9410	0.359	1.523	0.382	1.618	3.336	1.028	5.646	0.308	1.692
14	0.802	0.848	0.235	0.9453	0.384	1.507	0.406	1.594	3.407	1.121	5.693	0.329	1.671
15	0.775	0.816	0.223	0.9490	0.406	1.492	0.428	1.572	3.472	1.207	5.737	0.348	1.652
16	0.750	0.788	0.212	0.9523	0.427	1.478	0.448	1.542	3.352	1.285	5.279	0.365	1.636
17	0.728	0.762	0.203	0.9551	0.445	1.465	0.466	1.534	3.588	1.359	5.817	0.379	1.621
18	0.707	0.738	0.816	0.9576	0.461	1.454	0.482	1.518	3.640	1.426	5.854	0.404	1.608
19	0.688	0.617	0.187	0.9599	0.477	1.443	0.497	1.503	3.689	1.490	5.888	0.404	1.596
20	0.671	0.697	0.180	0.9619	0.491	1.433	0.510	1.490	3.735	1.548	5.922	0.414	1.585
21	0.655	0.670	0.173	0.9638	0.504	1.424	0.523	1.447	3.778	1.606	5.950	0.425	1.575
22	0.640	0.662	0.167	0.9655	0.516	1.415	0.534	1.466	3.819	1.659	5.979	0.434	1.566
23	0.626	0.647	0.162	0.9670	0.527	1.407	0.545	1.455	3.858	1.710	6.006	0.443	1.557
24	0.612	0.632	0.157	0.9684	0.538	1.399	0.555	1.445	3.895	1.759	6.031	0.452	1.548
25	0.600	0.619	0.153	0.9696	0.548	1.392	0.565	1.435	3.931	1.804	6.058	0.459	1.541

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P594

[4064] - 583

B.E. (Polymer Engineering)
PACKAGING TECHNOLOGY
(2008 Course) (Elective - II) (409365 (C)) (Sem. - I)

Time : 3 Hours]   *[Max. Marks :100*

Instructions to the candidates:

1) *All questions are compulsory.*
2) *Answers to the two sections should be written in separate books.*
3) *Figures to the right indicate full marks.*

SECTION - I

Q1) a) Elaborate on need of packaging and also emphasize on natural packaging.
[8]

b) Write a note on types of packaging.   **[9]**

OR

a) Write a note on plastic as packaging material.   **[8]**

b) Explain various criteria for selection of packaging material.   **[9]**

Q2) a) Write a note on new product development and its market.   **[8]**

b) Discuss life cycle assessment in case of packaging.   **[9]**

OR

a) Explain the importance of graphic design and its methods.   **[8]**

b) Explain the child resistant packaging and its need.   **[9]**

Q3) a) What is product-packaging relationship? Explain with suitable illustration.
[8]

b) Write a note on microbial sensitive packaging.   **[8]**

OR

a) Write a note centre of gravity in packaging.   **[8]**

b) Discuss physico-chemical characteristics in packaging.   **[8]**

SECTION - II

Q4) a) Explain absorption & diffusion of moisture and gases in packaging material.   **[8]**

b) Write a note on puncture and burst in packaging.   **[9]**

                                         OR

a) What do you understand by material properties? Explain pH with reference to the same.   **[8]**

b) Write a note on imbedded and un-reacted chemicals in packaging material.   **[9]**

Q5) a) Write a note on tear and tensile properties of packaging material.   **[8]**

b) Discuss the presence of sulphate, lignin in packaging material and its effect.   **[9]**

                                         OR

a) Explain physiological properties- odor and flavors in packaging.   **[8]**

b) Write a note on dimensions and strength properties of packaging material.   **[9]**

Q6) Discuss bottle filling lines including bottle washing, sterilization, filling, screw capping/crown corking, induction sealing, labeling etc. in detail   **[16]**

                                         OR

Explain the working of form fill seal machines of both vertical & horizontal Types in detail.   **[16]**

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P595

[4064] - 585

B.E. (Computer Engineering)
DESIGN & ANALYSIS OF ALGORITHMS
(Sem. - I) (2008 Course) (410441)

Time : 3 Hours]   *[Max. Marks :100*

Instructions to the candidates:
  1) *Answer any three questions from each section.*
  2) *Answers to the two sections should be written in separate books.*
  3) *Figures to the right indicate full marks.*
  4) *Assume suitable data, if necessary.*

SECTION - I

Q1) a) Apply the principles of mathematical induction to prove that the algorithm for function SQUARE, given below, is correct.   **[3]**

    Function SQUARE (n)

    if (n = 0) then return O

    else return 2 n + SQUARE (n–1) – 1

  b) Derive the time complexity of Quick sort algorithm.   **[5]**

  c) Write Dijkstra's algorithm for a directed graph. Compare it with all-pairs shortest path algorithm.   **[8]**

  d) Compare "Divide and conquer" with "Greedy" method.   **[2]**

                                OR

Q2) a) Describe the recurrence relation for computing time of Merge sort and solve it.   **[5]**

  b) What are NP-Hard and NP-complete problems?   **[2]**

  c) Solve the following instance of "job sequencing with deadlines" problem: n = 7,   **[3]**

    profits $(p_1, p_2, p_3, ..., p_7)$ = (3, 5, 20, 18, 1, 6, 30) and deadlines $(d_1, d_2, ..., d_7)$ = (1, 3, 4, 3, 2, 1, 2)

  d) Design and analyze an algorithm to solve the exponentiation problem using divide and conquer strategy.   **[8]**

Q3) a) What is the principle of optimality? Give example of a problem where principle of optimality does not hold. **[2]**

b) Solve the instance of 0/1 knapsack problem using dynamic programming: n = 4, m = 25 **[8]**

$(p_1, p_2, p_3, p_4) = (10, 12, 14, 16)$,

$(w_1, w_2, w_3, w_4) = (9, 8, 12, 14)$

c) Explain how dynamic programming is used to obtain optimal solution for traveling salesperson problem. Also explain why this technique is not used to solve TSP for large number of cities. **[6]**

OR

Q4) a) What are the various ways of implementing the knapsack problem? Explain. **[3]**

b) Write a algorithm for solving the problem of optimal binary search tree. **[10]**

c) Explain why flow shop scheduling problem is not solved using dynamic programming strategy for more than 2 tasks per job. **[3]**

Q5) a) Write an algorithm for N Queens problem which uses backtracking. Explain the implicit and explicit constraints of this problem. What is the time complexity of your algorithm? **[8]**

b) Solve the traveling sales person problem instance, by using branch and bound method, defined by the cost matrix given below. **[8]**

$$\begin{bmatrix} \alpha & 11 & 10 & 9 & 6 \\ 8 & \alpha & 7 & 3 & 4 \\ 8 & 4 & \alpha & 4 & 8 \\ 11 & 10 & 5 & \alpha & 5 \\ 6 & 9 & 5 & 5 & \alpha \end{bmatrix}$$

OR

Q6) a) Explain the problem of m-colourability for planar and non-planar graphs, and write an algorithm for m-colourability problem for general graph(non-planar) using backtracking strategy. **[8]**

b) Explain in detail how 0/1 knapsack problem can be solved using least cost branch and bound strategy. **[8]**

SECTION - II

Q7) a) Show that a polynomial time algorithm that makes polynomial number of calls to a polynomial time subroutine may run in exponential time. **[4]**

b) Prove that the clique decision problem (CDP) is NP - complete. **[8]**

c) Explain how Directed Hamiltonian Cycle (DHC) reduces to Traveling sales person decision problem. **[6]**

OR

Q8) a) What are non-deterministic algorithms? Give example. Explain where they are used while classifying algorithms. **[5]**

b) Prove that the chromatic number decision problem (CNDP) is NP-hard. **[8]**

c) Prove that partition reduces to minimum finish time preemptive job scheduling problem (m > 1). **[5]**

Q9) a) Differenciate between the models of computation for parallel computation. **[4]**

b) When are parallel algorithms "work. optimal". **[2]**

c) Describe a parallel algorithm for finding the connected components of a given graph. **[10]**

OR

Q10) a) Explain pointed doubling problem and why it can be solved parallely. **[5]**

b) Explain the odd-even Merge technique for efficient parallelization of merging. **[5]**

c) Prove that n arbitrary keys can be sorted in $O(\log^2 n)$ time using n EREW PRAM processors. **[6]**

Q11) a) Comment on the sequential and parallel technique for solving convex hull problem. **[8]**

b) Which are the useful algorithmic strategies for image edge defection problem? Explain why and also mention how underlying data structure affects the choice of algorithm. **[8]**

OR

Q12) a) Explain a deadlock detection and avoidance algorithm. Discuss the algorithmic strategy used. **[8]**

b) Evaluate all options for implementing Huffman's problem. **[8]**

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P597

[4064] - 587

B.E. (Computer Engineering)
OBJECT ORIENTED MODELING AND DESIGN
(2008 Course) (410443) (Sem. - I)

Time : 3 Hours]   *[Max. Marks :100*

Instructions to the candidates:

1)   Figures to the right indicate full marks.

2)   Answers to the two sections should be written in separate answer books.

3)   From section I, answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6

4)   From section II, answer Q.7 or Q. 8, Q.9 or Q.10, Q.11 or Q.12 .

5)   In design questions you are encouraged to make further suitable assumptions on scope of the systems given wherever felt necessary and do state your important assumptions if any.

6)   All diagrams/concepts are expected in UML2.0 except stated otherwise explicitly.

SECTION - I

Q1) Write briefly on the following   **[18]**

a)   What are flowcharts, what do they MODEL. Which diagram in UML 2 replaces or matches flowcharts?

b)   What do you understand by encapsulation property of object oriented systems? How does one implement this property in C++.

c)   Consider a bank's savings account class. For this class write an OCL statement to indicate that the minimum account balance should be maintained at 10000 rupees.

d)   How did Booch, Rumbagh and Jacobson contribute to UML. Which diagrams changed most from UML 1.4 to UML 2.

e)   Why model using UML?

f)   Draw a neatly labeled 4 + 1 architecture diagram.

OR

Q2) Write briefly on the following **[18]**

    a) OMG standard MDA with a diagram to show steps of MDA.

    b) Different ways of Unification in UNIFIED modeling language.

    c) The goals of TRANSITION phase of Rational Unified Process

    d) Stereotype <<Interface>> in UML 2.0

    e) UML profiles with examples

    f) Dependency relationship in various UML diagrams

Q3) a) What do you understand by functional and non functional requirements. Consider a search engine like goggle. Identify the likely functional and nonfunctional requirements for google like system. **[4]**

    b) With respect to requirements workflow (Hint usecases), What are actors. What do you understand by actor generalization? Considering a typical college library system, give examples of actors, and actor generalization. **[4]**

    c) Give a USECASE specification/template (Hint actor, precondition..)for a use case "BORROW a DVD", in a typical video rental shop. Make suitable assumptions about the scope. **[4]**

    d) In a MOVIE TICKET BOOKING SYSTEM, show an example for EXTENDS relationship. Make suitable assumptions and state the assumptions. **[4]**

<div align="center">OR</div>

Q4) a) In the context of activity diagrams, With examples of your own, write on the three types of nodes: ACTION, OBJECT, CONTROL **[6]**

    b) Draw a complete ACTIVITY diagram (for depicting Business process/ workflow of Selecting a TEAM for college sports team). The sports incharge announces the audition rounds. Students apply. A fitness test is conducted by a team of doctors. Only students who are fit medically as determined by fitness test are eligible. Three selection rounds are held for eligible students, where at each level some students are short listed and some eliminated, till there are 14 competent players.. While the short listing is going on, in parallel the sports incharge of college is inviting other college teams for friendly matches. Once the short listing is done and other college teams accept an invitation, the student's team is announced, the schedule is prepared for friendly matches. Use concepts like Fork and Join, Object nodes, Decision Nodes, swim lanes. Make further suitable assumptions if required. **[10]**

Q5) a) Consider a class STUDENT that keeps personal details and another class MARKSHEET that keeps exam performance details of the student. The two classes collaborate to give the student's personal and exam details .Make suitable assumptions about the two classes. Draw CRC cards to show the two classes **[4]**

b) With own examples and a UML diagram, explain how boundary, entity and control class categorization helps identify classes. **[6]**

c) Write short notes on COMPOSITE STRUCTURE diagrams. **[6]**

OR

Q6) a) Consider a railway reservation and enquiry system. Passengers can book tickets of different categories, look at personal ticket history, check status of reservation, check schedules, check availability OF ROUTES, TRAINS,TICKETS, compute fares for plans, make payments by credit cards, print ETICKETS, cancel tickets and so on. The train has various classes, compartments. Add further assumptions about the scope of application if necessary. Draw a CLASS diagram for this description using full UML notation for class diagrams, showing classes, major attributes,methods, relationships **[8]**

b) Compare <<import>>, <<access>> w.r.t a package diagram. **[4]**

c) What do you understand by concepts: an ASSOCIATION and an ASSOCIATION CLASS. What is the relation/comparison between the two concepts **[4]**

SECTION - II

Q7) a) Compare Interaction overview diagram, WITH activity diagrams and WITH interaction diagrams **[4]**

b) With your own example compare for a sequence diagrams the usage of OPT and ALT combined fragments. What do the above constructs translate into a programming language (like C), respectively? **[4]**

c) CONSIDER a simple USECASE in a banking system like "withdraw money from a savings account". Make suitable assumptions. Identify classes/objects for the usecase and realize the usecase by DRAWING a relevant SEQUENCE DIAGRAM. **[8]**

OR

Q8) In context of STATE diagrams, explain concept, give notation, example for following: **[16]**

    a) Protocol state machine

    b) Event, transition, action, guard condition

    c) Concurrent sub states

    d) Entry, exit, deferred, do activity, self transition

Q9) a) Compare and contrast: class, component, interface, port, subsystem and module. Give examples of each with UML notation. **[10]**

    b) What are provided interfaces. Consider a generic reusable component like "LOGIN COMPONENT". A partial description of the services the component offers are taking username, password, encryption, secret question to reset password...

    Make further suitable assumptions and draw the component, its interfaces and its services using UML. **[6]**

<div align="center">OR</div>

Q10) a) What are GUI , UI components, what are advantages of GUI components and how have you used them in VB environment, give examples. **[6]**

    b) How does one model a web based application using deployment diagrams **[4]**

    c) Give notation and explanation for following concepts related to deployment diagram. : Node, artifact, <<manifest>>, communication path, deployment, execution environment, device. **[6]**

Q11) a) Write short notes on reverse engineering. **[6]**

    b) Forward engineer UML class and relationships to C++. **[6]**

    c) What are design patterns. **[6]**

<div align="center">OR</div>

Q12) a) How do you forward engineer interface to c++,java. **[6]**

    b) What is an iterator pattern, what is its use and how is it modeled using UML. **[6]**

    c) How is a class diagram most useful for documenting design patterns give your own example. **[6]**

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P602

[4064] - 592

B.E. (Computer Engineering)

MULTIMEDIA SYSTEMS

(Sem. - I) (2008 Course) (Elective - II) (410445(A))

Time : 3 Hours]   *[Max. Marks :100*

Instructions to the candidates:

1) *Answers to the two sections should be written in separate answer books.*
2) *Neat diagrams must be drawn wherever necessary.*
3) *Figures to the right indicate full marks.*
4) *Assume suitable data, if necessary.*

SECTION - I

Q1) a) State and explain various components of Multimedia? Also explain need of Multimedia? **[6]**

b) Explain architecture of Multimedia database system. **[6]**

c) Explain Characteristics of Multimedia presentation. **[6]**

OR

Q2) a) What is Multimedia authoring? State and explain any two Multimedia authoring tools. **[9]**

b) Explain windows Multimedia support. Also explain Multimedia API. **[9]**

Q3) a) State and explain different data types for image? **[4]**

b) What is image enhancement? Explain image enhancement techniques using filtering in frequency domain? **[6]**

c) What is lossy and lossless image compression? State different image compression technique and explain any one in detail. **[6]**

OR

Q4) a) What is Arithmetic Coding? Show encoding and decoding of 'dad' using table 1, Also calculate tag value. **[8]**

Table 1

Symbol	a	b	c	d
Probability	0.4	0.2	0.1	0.3
Sub-Range	(0.0 - 0.4)	(0.4 - 0.6)	(0.6 - 0.7)	(0.7 - 1.0)

b) Explain color image processing in detail. **[8]**

Q5) a) Write and explain characteristics of sound wave. **[8]**

b) What is MIDI? Explain MIDI messages. **[8]**

OR

Q6) a) Write different audio file formats. Explain any two in brief **[8]**

b) Explain Pulse Code Modulation and Delta Modulation **[8]**

SECTION - II

Q7) Write short note on: **[18]**

a) Huffman Coding

b) HDTV

c) H.261 video format

OR

Q8) a) Explain LZ and LZW coding. **[6]**

b) Explain with suitable diagram encoding and decoding of MPEG-4. Also explain **[12]**

i) Profiles and Levels

ii) Descriptors

iii) Scene Graph

Q9) a) What is animation? Explain following techniques of animation **[8]**

       i)   Motion Cycling

       ii)   Onion Skinning

   b) What is rendering? Explain different rendering algorithms **[8]**

<div align="center">OR</div>

Q10) a) State and explain principles of animation. **[8]**

   b) What is OpenGL? Write and explain main features of OpenGL **[8]**

Q11) a) Explain roll of multimedia in education? Also explain challenges in e-learning systems. **[8]**

   b) State and explain any three parameters on which Quality of Service of multimedia data transmission depends. Also explain Multimedia on demand. **[8]**

<div align="center">OR</div>

Q12) a) Explain media consumption in brief? State any four web based multimedia applications. Explain anyone in detail. **[8]**

   b) Explain any two IP based multimedia protocols. **[8]**

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P613

[4064] - 61

B.E. (Production Engineering)
CAD/CAM/CIM
(2003 Course) (Sem. - II)(411089)

Time : 3 Hours]   *[Max. Marks :100*

Instructions to the candidates:

1) *Attempt one question of each unit form section I and section II.*

2) *Answer to the questions should be written on separate books.*

3) *Draw neat diagram wherever necessary.*

4) *Assume suitable data, if required.*

SECTION - I
Unit - I

Q1) a) Perform the following transformation if the coordinates of vertices of square are A(1, l), B(5, 1), C(5, 5), D(1, 5) the transformation in sequence are **[8]**

   i)   Scaling by 1.5 units in X and 2 in Y direction.

   ii) Rotate by 30º anticlockwise about A,

   b) Compare various solid modelling approaches in CAD system. **[8]**

                                    OR

Q2) a) Explain IGES file format. **[6]**

   b) A triangle XYZ with end points X(2, 2) and Y(5, 2) Z(3, 4)find new co-ordinates of a triangle for following transformation **[10]**

   i)   Translate X 2 unit and Y 3 unit,

   ii) Scale in X and Y direction by 1.5,

   iii) Rotate by 60 degree in CCW,

   iv) Reflection about origin

Unit - II

Q3) a) What is meant by flexibility in connection with FMS? Explain different data files in FMS. **[6]**

b) Consider a CNC M/c center process a raw part at a time in M/M/l fashion. Let parts arriving at a rate 20/hr and service rate is 30 part/hr. find machine utilisation, mean number of parts in system and in queue ,mean waiting time in system and in queue. **[6]**

c) Explain CAN cycle used in CNC programming. **[6]**

OR

Q4) a) Compare machine flexibility, routine flexibility and production flexibility. **[8]**

b) Write a CNC program in G and M code for a part as shown in fig No.1. Also write a remark for each block **[10]**
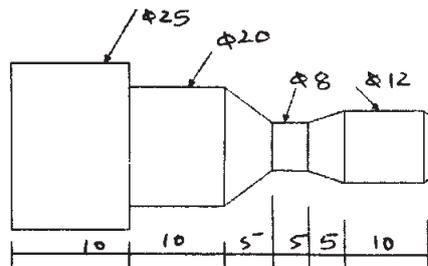
Unit - III

Q5) a) The following are the six degrees of freedom that provides the robot with capacity to move the end effectors through required sequence of motions: **[8]**

i) Vertical traverse,

ii) Radial traverse,

iii) Rotational traverse .

Wrist motions (swivel, bend, Yaw). Explain these with simple sketches

b) Describe brief CAQC **[8]**

OR

Q6) a) Define CIM and Explain the evolution of CIM? **[8]**

b) Explain any two engineering module **[8]**

SECTION - II
Unit - IV

Q7) a) Explain the steps with neat diagram for producing a part through fused deposition method. **[8]**

b) Compare steriolithography RP with 3D printing. **[7]**

OR

Q8) a) Explain basic methodology for getting a product through RP? Compare it with other process of manufacturing **[8]**

b) Explain staircase effect in RP parts. How it will be minimised **[7]**

Unit - V

Q9) a) Consider the following part matrix .Apply rank order clustering algorithm to it and identify the part families and machine groups **[8]**

	1	2	3	4	5	6	7	8
1			1	1	1	1		
2	1		1		1		1	1
3		1		1				
4			1			1		
5	1				1		1	
6				1				
7		1		1	1			
8			1					1

b) Explain different steps to be followed for solving 1-d problem using FEA **[6]**

c) Explain the concept of group technology **[6]**

Q10) a) A stepped bar is made of two materials joined together as shown in following figure no2. The bar is subjected to an axial pull of 20KN. Determine the displacement, reaction force at support, stress of each of the section using a 1D spar element **[14]**
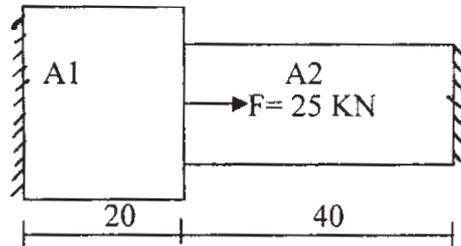
A1 = 80 mm², E1 = 200 GPa A2 = 40 mm², E2 = 120 GPa

b) Discuss with suitable example optiz system of codification in GT **[6]**

Unit - VI

Q11) a) What is concurrent engineering? Explain steps in concurrent engineering. **[7]**

b) Explain CIM OSA model and its application in operating environment. **[8]**

OR

Q12) a) Explain IBM Model in brief. **[8]**

b) Explain QFD is used in concurrent Engg. **[7]**

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P616

[4064] - 93

B.E. (Electrical)
VLSI DESIGN
(2003 Course) (Elective - II) (Sem. - II)(403150)

Time : 3 Hours]   *[Max. Marks :100*

Instructions to the candidates:

1) *Answer three questions from section I and three questions from section II.*
2) *Answers to the two sections should be written in separate books.*
3) *Neat diagrams must be drawn wherever necessary.*
4) *Figures to the right indicate full marks.*

SECTION - I

Q1) a) What is the difference between truth table and excitation table of a flip-flop? Explain with example. **[8]**

b) Explain moore and mealy machine using any one example. Draw its truth table and state diagram. **[10]**

OR

Q2) a) Differentiate between mealy and moore machine model. **[8]**

b) Draw truth table and circuit diagram and timing diagram for 4 bit Ring counter. **[10]**

Q3) a) Explain the EDA tool design tool. Also draw its flowchart. **[8]**

b) Define and write VHDL syntax for **[8]**

     i) Entity   ii) Architecture

     iii) Component   iv) Process

OR

Q4) a) Write VHDL code for 8 : 1 multiplexer using Behavioral modelling. **[8]**

b) Write VHDL code for 4 bit synchronous up counter using process statement. **[8]**

Q5) a) Explain the various data-types available in VHDL alongwith example. **[8]**

b) Explain subprogram and write VHDL code for the same. **[8]**

OR

Q6) a) Explain the various data-objects available in VHDL coding with example. **[8]**

b) What is configuration? Explain with VHDL code. **[8]**

SECTION - II

Q7) a) Implement using CMOS. **[8]**
   i) NOT ii) AND
   iii) OR iv) NAND gate

b) What are the specifications of CMOS. Explain any 4 with definition. **[8]**

OR

Q8) a) Define the following terms related to CMOS. **[8]**
   i) FAN IN ii) FAN OUT
   iii) Power Dissipation iv) Figure of merit
   Also explain its importance.

b) Explain the constructional details of depletion type MOSFET. **[8]**

Q9) a) Draw the block diagram and explain the Architecture of FPGA. **[8]**

b) Draw state diagram and state table for "1011" detector using mealy machine model. **[8]**

OR

Q10) a) Differentiate PLA and PAL. **[8]**

b) What is the difference between simulation and synthesis. Explain with suitable example. **[8]**

Q11) a) Write VHDL code for Barrel shifter. **[8]**

b) Write VHDL code and also draw block diagram for ALU. **[10]**

OR

Q12) a) Write VHDL code for 8 × 8 RAM. **[8]**

b) Draw block diagram and write VHDL code for 4 bit Adder. **[10]**

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[4064] - 141

P618

B.E. (Instrumentation & Control)
PROCESS INSTRUMENTATION - I
(2003 Course) (Sem. - I) (406261)

Time : 3 Hours] *[Max. Marks :100*

Instructions to the candidates:

1) *Answer three questions from section I and three questions from section II.*
2) *Answers to the two sections should be written in separate books.*
3) *Neat diagrams must be drawn wherever necessary.*
4) *Figures to the right indicate full marks.*
5) *Use of logarithmic tables, slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.*
6) *Assume suitable data, if necessary.*

SECTION - I

Q1) a) What are the different sources of noise in a control valve? Compare Source treatment and Path treatment methods used for noise reduction. **[8]**

b) A control valve is used for flow control. The line size is 10 inches and the liquid is water. Maximum flow rate is 3,000 gpm and minimum is 250 gpm. The line pressure varies between 40 to 50 psi. The downstream pipe loss is 2 psi at 3,000 gpm and the downstream pressure is 25 psi. Select a valve size and type that will satisfy the process. **[8]**

OR

Q2) a) Describe the valves used for high pressure and high temperature applications. **[8]**

b) Elaborate control valve selection criteria. **[8]**

Q3) a) With the help of suitable examples explain why Dead Time processes are difficult to control? **[9]**

b) Compare self regulating and non - self regulating processes. **[9]**

<div align="center">OR</div>

Q4) a) Explain the following: **[18]**

      i)   Interacting Lags

      ii)   Quarter Amplitude Damping

      iii)   Dead band

      iv)   Time Constant

Q5) a) Explain the tuning of the Cascade Control. **[8]**

    b) What is Auctioneering Control? Explain with reference to its applicability.

                                                                   [8]

<div align="center">OR</div>

Q6) a) With a suitable application explain the working of a Feedforward Control? What are its limitations? **[8]**

    b) Explain why ratio calculations are done outside the controller. **[8]**

<div align="center">**SECTION - II**</div>

Q7) a) Compare SLPC and MLPC. **[9]**

    b) What is the role of Scaling in Process Control? Explain the various steps involved for scaling in a Flow Ratio Control application. **[9]**

<div align="center">OR</div>

Q8) a) With the help of necessary equations explain the analysis of a typical Pressure Loop. **[9]**

    b) List the detailed specifications of a MLPC. **[9]**

Q9) a) With the help of a neat block diagram, explain the working of a Model Reference Adaptive Controller. **[8]**

    b) Compare Conventional Controllers and Intelligent Controller. **[8]**

<div align="center">OR</div>

Q10) a) Explain various methods used for parameter estimation in an Adaptive Control. **[8]**

b) With the help of a suitable block diagram explain the working Self tuning Controller. **[8]**

Q11) a) Explain the techniques for analysis of process control performance using statistical process control. **[8]**

b) Explain the use of Model predictive control in Process Control applications. **[8]**

OR

Q12) Write short notes on: **[16]**

a) Fuzzy Logic Control

b) ANN based Control

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[4064] - 146

P619

B.E. (Instrumentation & Control)
LASER APPLICATIONS IN INSTRUMENTATION
(2003 Course) (Elective - I) (Sem. - I) (406264)

Time : 3 Hours]   *[Max. Marks :100*

Instructions to the candidates:

1) *Answer any three questions from section I and any three questions from section II.*
2) *Answers to the two sections should be written in separate books.*
3) *Neat diagrams must be drawn wherever necessary.*
4) *Use of electronic pocket calculator is allowed.*
5) *Assume suitable data, if necessary.*

SECTION - I

Q1) a) Describe the process of emission and absorption of radiation.   **[8]**

b) Explain the importance of Einstein's equations in emissions of radiation.

[8]

OR

Q2) a) State the different processes due to which the small gain coefficients of laser get affected.   **[8]**

b) Write short notes on: **[8]**

i) Q switching   ii) Laser modes

Q3) a) What are different laser system features which are applicable to most commercial and industrial lasers? Explain each in short.   **[9]**

b) Estimate the efficiency of a GaAs laser operating well above threshold. The refractive index of material is 3.5 and laser cavity length is 0.2 mm. The loss coefficient is 900 per metre length and the internal quantum efficiency is 0.8.   **[4]**

c) What are the safe laser laboratory operations?   **[5]**

OR

Q4) a) Explain the construction and working of GaAs homojunction semiconductor diode laser. **[8]**

b) How the laser products are classified for safety standards? **[4]**

c) Calculate the threshold pumping power of a Nd: Glass laser for critical population inversion of 9×10^{21} /m³ and sponteneous life time of 400 μ s. The upper level is at an energy of l.5eV. **[6]**

Q5) a) Describe how Fabry-Perot interferometer. **[8]**

b) What is Speckle Pattern? Describe subjective and objective speckles. **[8]**

OR

Q6) a) Describe the dynamic tracking of speckle pattern for displacement measurements. **[8]**

b) What are the properties of speckle pattern? Describe each in short. **[8]**

SECTION - II

Q7) a) Explain the principle of operation of Laser velocimeter. **[8]**

b) What are the two options for the electronic processing of the Doppler signal? Compare it. **[8]**

OR

Q8) a) Explain the frequency domain processing of Doppler signal in detail. **[8]**

b) What are the performance parameters of operation of laser velocimeter? Discuss. **[8]**

Q9) a) What is Sagnac effect? Show how is the phase shift is proportional to the angular velocity. **[8]**

b) What are the components required for all fiber FOG configuration? Explain each in short. **[8]**

OR

Q10) a) Show that the frequency of the sagnac signal in RLG is proportional to the angular velocity of rotation. **[8]**

b) Explain in detail the closed loop configuration of Fiber Optic Gyroscope. **[8]**

Q11) a) Write a short note on Holographic Interferometer. **[9]**

b) What are different emulsions used to record the holograms? Mention the characteristics of it. **[9]**

OR

Q12) a) A thin strip of the hologram undergoing stress parallel to the x-axis is illuminited by a He-Ne laser. The fringes are localized in a plane having slope of 1.6 per unit length in x-direction and the fringe spacing is found to be 2 mm. Hence find the strain. **[8]**

b) List out the applications of holographic interferometer that you know. Explain any one in detail. **[10]**

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P640   **[4064] - 491**

B.E. (Electronics & Telecommunication)
ELECTRONIC PRODUCT DESIGN
(2008 Course) (Sem. - I) (404181)

Time : 3 Hours]   *[Max. Marks :100*

Instructions to the candidates:

  1) *Answer three questions from section I and three questions from section II.*

  2) *Answers to the two sections should be written in separate books.*

  3) *Figures to the right indicate full marks.*

  4) *Use of electronics pocket calculator is allowed.*

  5) *Assume suitable data, if necessary.*

SECTION - I

Q1) a) Compare consumer, industrial, and military product for   **[6]**

  i)   Cost/Performance ratio

  ii) Reliability

  iii) Temperature

  b) With the help of neat block diagram. Explain the different stages of an electronics product development. What will be the effect on development, if we skip any one stage?   **[10]**

  c) Define shielding effectiveness and the factors on which it depends.   **[2]**

OR

Q2) a) Explain Bathtub curve for reliability indicating all its regions. Also explain how failure rate can be Reduced in different regions of bathtub curve. **[8]**

  b) Explain the terms MTBF & MTTF.   **[4]**

  c) A circuit consist of 200 same components with failure rate of 10×10^{-9}/hr and 400 holder joints with failure rate of 100×10^{-9}/hr. Calculate MTBF. Also Calculate Reliability and Unreliability for 1000 hrs.   **[6]**

Q3) a) In analog signal conditioning what are the different factors affecting choice of opamp. **[8]**

b) Explain any one application of data acquisition system using MAX 11046 which consists high Performance, multichannel simultaneous sampling ADCs. **[8]**

OR

Q4) a) Explain following terms for ADC & DAC **[8]**

    i) Resolution

    ii) Full scale o/p voltage

    iii) Accuracy

    iv) Linearity

b) Explain error budget analysis with one example of an electronic product. **[8]**

Q5) a) Design a 4-ch temp scanner using AD7817 and any microcontroller also explain **[10]**

    i) Structure of address register for channel selection.

    ii) How to set alarm using over temp register for 50° C .

    iii) How to measure the temperature using on-chip Sensors.

b) Compare at least 3, 8 bit microcontroller of different manufactures on the basis of **[6]**

    i) I/O Pins

    ii) Counters

    iii) RAM & ROM

    iv) Other features

OR

Q6) a) Give the overview of following buses and protocols **[10]**

    i) RS-232

    ii) RS-485

    iii) 12C

    iv) SPI

b) Explain working principle of analog resistive touch screen. Interface 4-wire resistive touch screen with any microcontroller. **[6]**

SECTION - II

Q7) a) Explain the following approaches in development of application software for electronic product **[12]**

      i) Top-Down approach

      ii) Bottom-Up approach

      iii) Modular programming

      iv) Water-fall model

   b) What are the factor affecting choice between assembly language and High level language like 'c 'or c++. **[6]**

OR

Q8) a) An 8-ch ADC reads temp data using RTDs. The temp data is to be logged in system memory, and same data is to be displayed on 6-digit, 7- segment LCD Display. Then **[12]**

      i) List all the steps necessary to develop the software for this system.

      ii) Draw detail flow chart for acquiring data and displaying, it on 6-digit, 7-segment multiplex LCD display

      iii) Also give some documentation details for above system

   b) Explain different hardware test programs for hardware diagnostics. **[6]**

Q9) A mixed signal system on single PCB contains the following sub circuits

   a) Power supply for analog section

   b) Power supply for digital circuit

   c) Signal conditioning circuit

   d) ADC

   e) Microcontroller

   f) LCD display circuit

   g) Clock for digital circuits and microcontroller

Then discuss in detail the recommended PCB design practices for each of above and draw sketch indicating relative placement of their sub circuit. Justify your answer for placement **[16]**

OR

Q10) a) List the EMI/EMC considerations in PCB designing. How will you minimize the spreading of radio frequencies in multi layer PCB? **[8]**

b) What are the issues to be considered in ensuring signal integrity in high speed circuits? **[8]**

Q11) a) Explain detail working of type - I phase detector and type - II phase detector in PLL . **[8]**

b) What is communication link analysis? Explain various sources of signal loss and noise. **[8]**

OR

Q12) a) Design a hypothetical experiment to measure path loss Ls, at friquencies f1 = 30 Mhz and f2 = 60 MHz, when the distance between the transmitter and receiver is 100Km. Find the effective area of the receiving antenna and calculate path loss in decibels for each case. **[10]**

b) Write a short note on equalizer. **[6]**

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P1030

[4064]-156

B.E. (Instrumentation & Control)
BUILDING AUTOMATION - II
(2003 Course) (406270E) (Sem. - II) (Elective - II)

Time : 3 Hours]   *[Max. Marks : 100*
Instructions to the candidates:
    1)   *All questions are compulsory.*
    2)   *Answers to the two sections should be written in separate books.*
    3)   *Neat diagrams must be drawn wherever necessary.*
    4)   *Figures to the right indicate full marks.*
    5)   *Assume suitable data, if necessary.*

SECTION - I

Q1) a)   Describe various air properties in relation to HVAC.   **[8]**

       b)   Describe different ways of heat transfer with suitable examples.   **[10]**
<div align="center">OR</div>

Q2) a)   Discuss Human Comfort and Zones.   **[10]**
       b)   Explain use of Psychometric chart.   **[8]**

Q3) a)   Discuss direct heating and indirect heating.   **[6]**
       b)   Describe cooling system of HVAC.   **[10]**
<div align="center">OR</div>

Q4) a)   Explain difference between boiler and Furnace.   **[6]**
       b)   Describe Ventilation system of HVAC.   **[10]**

Q5) a)   Explain multiloop controller DDC.   **[8]**
       b)   Discuss various parameter measurement sensors and final control element with respect to evaporator.   **[8]**
<div align="center">OR</div>

Q6) a)   Describe P, PI and PID control actions with HVAC.   **[8]**
       b)   Explain: **[8]**
           i)   Optimum start.
           ii)   Night cycle.
           iii)   Night purge.
           iv)   Enthalpy.

SECTION - II

Q7) a) What is MCC? Explain basic component of MCC with suitable diagrams. **[10]**

b) Explain Daisy Chain or Bus Topology LON Bus protocol. **[8]**

OR

Q8) a) Explain BAC net Protocol. **[10]**

b) Explain Communication basic for HVAC. **[8]**

Q9) a) Draw ASHARE symbol for sensors and transmitters. **[10]**

b) Explain Green Building. **[6]**

OR

Q10) a) What are the functions of Integrated Building management systems. **[10]**

b) What do you mean energy management? Explain types of Energy Measurement Devices. **[6]**

Q11) a) Explain different features of IBMS & List benefits of IBMS. **[6]**

b) Explain BMS Verticals. **[10]**

OR

Q12) a) Explain the verticals of BMS for **[10]**
   i) Healthcare.
   ii) Industrial.

b) Explain the role of Energy management in security & HVAC Systems. **[6]**

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[4064]-193

P1031

B.E. (Chemical Engineering)
CHEMICAL PLANT ENGINEERING
(2003 Course) (409351) (Sem. - II)

Time : 3 Hours]   *[Max. Marks : 100*

Instructions to the candidates:
1)   Answer any three questions from each section.
2)   Answers to the two sections should be written in separate books.
3)   Neat diagrams must be drawn wherever necessary.
4)   Figures to the right indicate full marks.
5)   Use of logarithmic tables slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.
6)   Assume suitable data, if necessary.

SECTION - I

Q1) a)   What is Techno Economic Feasibility Study? Explain in Detail.   **[10]**

b)   What is Flow sheeting? Explain its importance.   **[8]**

OR

Q2) a)   Explain the types of Process Flow Diagrams.   **[9]**

b)   What is Laboratory Data and Plant Data?   **[9]**

Q3) a)   Explain thermodynamic and kinetic feasibility, process feasibility, capacity identification.   **[10]**

b)   How to select the process specification and equipment specification?

[6]

OR

Q4) Explain the Plant location and layout for Petrochemical Industry in detail.

[16]

Q5) Write the steps for estimation of various utilities like Process water, boiler feed water. Explain in detail.   **[16]**

OR

Q6) Discuss about wastewater treatment plant of Petrochemical Industry.   **[16]**

P.T.O.

SECTION - II

Q7) Discuss the pipe size estimation procedure with proper example. **[16]**

OR

Q8) Explain the different types of pipe fittings and their material of selection. **[16]**

Q9) Write in detail about NPSH calculations with suitable example. **[18]**

OR

Q10) a) What are types of compressors, fans, blowers and vacuum systems operation?

b) Discuss the maintenance of plant and auxiliary systems.

[18]

Q11) Write short notes on: **[16]**
  a) CPM.
  b) PERT.

OR

Q12) Write short notes on: **[16]**
  a) HAZOP.
  b) Indian boiler regulations Act.

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[4064] - 90

P1086

B.E. (Electrical)

ENERGY MANAGEMENT

(Sem. - II) (403147) (2003 Course)

Time : 3 Hours]   *[Max. Marks :100*

Instructions to the candidates:

1) *Answer 3 questions from section I and 3 questions from Section II.*
2) *Answers to the two sections should be written in separate books.*
3) *Neat diagrams must be drawn wherever necessary.*
4) *Figures to the right indicate full marks.*
5) *Use of logarithmic tables slide rule, Mollier charts, electronic pocket calculator and steam table, is allowed.*
6) *Assume suitable data, if necessary.*

SECTION - I

Q1) a) Classify the sources of energy with two examples. Explain in detail Indian energy scenario of renewable energy sources and limitations of these sources. **[8]**

b) Explain the salient features of Electricity Act 2003. **[8]**

OR

Q2) a) Explain in detail how the energy sector is reformed by the Government of India for the development of the nation. **[8]**

b) Lists the short term and long term policy regarding the use of energy to reduce the cost of energy. **[8]**

Q3) a) Explain the aim of energy audit. Accurate measurement is very important in energy audit. Why? **[6]**

b) Discuss the role of energy manager and energy auditor. **[6]**

c) List the various instruments required to measure the electrical energy for energy audit purpose. **[4]**

OR

Q4) a) What is demand side management? What are advantages of DSM to energy Supply Company and the consumers? Explain the barriers in implementing the DSM programs by the utility. **[8]**

b) What is energy policy? It is very important for the any industry. What are the advantages of the same? How it is the formatted? **[8]**

P.T.O

Q5) a) Explain the use of least square method in energy management. **[8]**

b) What are the various methods to present data of audited energy before top management? Why not data of the audited energy generally not presenting in the form of tables? **[10]**

OR

Q6) a) What do you understand by the term "benchmarking" and list few benefits. **[6]**

b) Explain how Sankey Diagram is useful for energy analysis. **[6]**

c) What are the 4 pillars of energy management? What is comprehensive definition of EM System. **[6]**

SECTION - II

Q7) a) Explain in detail CUSUM technique. What is use of this method in energy management? **[6]**

b) What are the billing components of two part tariff structure of industrial utility. Explain. **[6]**

c) What is TOD tariff, Explain use of TOD tariff as DSM option. Give example of TOD tariff. **[6]**

OR

Q8) a) Evaluate the financial merit of the proposal shown in the table below. Consider annual discount rate 7.5% for each project. Use Net Present Analysis technique. **[8]**

	Project - I	Project - II
Capital Cost (Rs.)	Rs. 1,00,000/-	Rs. 1,00,000/-
Year	Net Annual Saving (Rs.)	Net Annual Saving (Rs.)
1	+9,500/-	+10,500/-
2	+9,500/-	+8,500/-
3	+9,500/-	+8,500/-
4	+9,500/-	+8,200/-
5	+9,500/-	+8,000/-
6	+9,500/-	+7,500/-
7	+9,500/-	+7,000/-

b) State and explain the effective measures to be taken by the government and consumers to reduce T & D losses. **[4]**

c) Explain the simple pay back period criterion for the selection of energy conservation program. What are advantages and limitation of the SPP method in implementing the conservation program in an industry. **[6]**

Q9) a) Explain how the efficiency of pumping system can be improved by using variable speed drive. **[8]**

b) What are energy conservation opportunities for the lighting systems in industry? **[8]**

<div align="center">OR</div>

*Q10)*a) What actions can be taken to improve the efficiency of the street lighting? **[8]**

b) Write short note on heat recovery from process heating applications.**[8]**

*Q11)*a) Explain the case study of textile industry for the better energy usage.**[8]**

b) Explain why government has motivated sugar industry for the co-generation plant. Explain advantages and disadvantages of the co-generation plant. **[8]**

<div align="center">OR</div>

*Q12)*a) In modern thermal power plants, what are the actions taken to improve the efficiency of plant. **[8]**

b) Explain energy audit case study steel industry. **[8]**

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P1088

[4064] - 290

B.E. (Biotechnology)

BIOINFORMATICS AND REGULATIONS

(Sem. - II) (416288) (2003 Course)

Time : 3 Hours]　　　　　　　　　　　　　　　　*[Max. Marks :100*

Instructions to the candidates:

　　1)　Answer three questions from section I and three questions from Section II.

　　2)　Answers to the two sections should be written in separate answer books.

　　3)　Neat diagrams must be drawn wherever necessary.

　　4)　Figures to the right indicate full marks.

　　5)　Assume suitable data, if necessary.

SECTION - I

Q1) How can you relate the techniques in genetic engineering with database development in bioinformatics? **[16]**

OR

Q2) What is clustal analysis? Explain the concept in detail. **[16]**

Q3) Why protein is considered as an important molecule in bioinformatics? Which aspects of proteins are explored with the use of bioinformatics? **[16]**

OR

Q4) Explain in detail structural databases of proteins. **[16]**

Q5) Explain in detail analytical tools used for DNA sequencing. **[18]**

OR

Q6) What is microarray? Explain uses of microarray in genomics also elaborate on other applications of microarray. **[18]**

SECTION - II

Q7) Explain in detail future scope of bioinformatics in biotechnology product development. **[18]**

OR

Q8) What is drug designing? How this will help in vaccine design and epitope analysis. **[18]**

P.T.O

Q9) Write short notes on (Any 2)   **[16]**
   a)   Product development in biotechnology.
   b)   GMP.
   c)   Role of DCGI.
   d)   Relation between bioinformatics and Regulations.

*Q10)*Explain in detail clinical research and data management.   **[16]**

<div align="center">OR</div>

*Q11)*Write short notes on: **[16]**
   a)   IPR and Patents.
   b)   Trade secrets and Trade Marks.

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P1100   **[4064]-259**

B.E. (Computer)
NETWORKS AND INFORMATION SECURITY
(2003 Course) (410448) (Sem. - II)

Time : 3 Hours]   *[Max. Marks : 100*

Instructions to the candidates:

1) *Answer to the two sections should be written in separate books.*
2) *Neat diagrams must be drawn wherever necessary.*
3) *Figures to the right indicate full marks.*
4) *Assume suitable data, if necessary.*

SECTION - I

Q1) a) What is the difference between active and passive attack? Give one example of each. **[8]**

b) What do you mean access control? Explain how access control matrix provides the security. **[8]**

OR

Q2) a) Define Security. What is the need of security? Explain the OSI Security Architecture. **[8]**

b) What is spoofing? Explain different types. What is DNS spoofing? **[8]**

Q3) a) Explain the working of RSA? Given two prime numbers P = 17 and Q = 29 find N, E and D in an RSA encryption system. **[10]**

b) Explain in brief Diffie-Hellman Key exchange with suitable example. **[6]**

OR

Q4) a) What is difference between Message Authentication Code and One-Way hash function? **[8]**

b) Explain Digital Signature. What are the properties and requirements of Digital Signature Scheme? **[8]**

Q5) a) What is the block size in DES? What is the cipher key size in DES? What is the round key size in DES? Why does the DES function need an expansion permutation? **[12]**

b) Describe the various phases of AES. **[6]**

<div align="center">OR</div>

Q6) a) What is the purpose of S-boxes in DES? **[6]**

    b) What is double DES? What kind of attack on double DES makes it useless? **[6]**

    c) Differentiate between Linear and Differential Cryptanalysis. **[6]**

<div align="center">

SECTION - II

</div>

Q7) a) Compare between PPTP and L2TP VPN protocol. **[8]**

    b) Explain the IPSec security protocol AH and ESP. How AH provides the authentication and integrity checking capabilities? **[8]**

<div align="center">OR</div>

Q8) a) What are the differences between a hardware VPN and Software VPN? List the four components of VPN. **[8]**

    b) List different ways in which secret keys can be distributed to two communicating parties. **[8]**

Q9) a) State the various routing protocols. Which protocols support for authentication? What is router hardening? **[8]**

    b) What is the role of Firewall? What are the attributes of Firewall? What are the capabilities and limitation of Firewall? **[8]**

<div align="center">OR</div>

Q10) a) Explain the concept of Demilitarized Zone (DMZ). When is a DMZ required? How is it implemented? **[8]**

    b) Explain with suitable diagram the concept of Honeypots. List the types of Honeypots along with advantages and disadvantages. **[8]**

Q11) Write short note on : **[18]**

    a) Secure Electronic Transaction (SET).

    b) Pretty Good Privacy (PGP).

    c) Secure/Multipurpose Internet Mail Extension (S/MIME).

<div align="center">OR</div>

Q12) Write short note on : **[18]**

    a) E-Cache.

    b) Kerberos.

    c) Privacy Enhanced Mail (PEM).

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P1102

[4064]-112

B.E. (Electronics)

BIO-MEDICAL ELECTRONICS

(2003 Course) (404211) (Sem. - II)

Time : 3 Hours]   *[Max. Marks : 100*

Instructions to the candidates:

1) *Answer three questions from each section.*
2) *Answers to the two sections should be written in separate books.*
3) *Figures to the right indicate full marks.*
4) *Neat diagrams must be drawn wherever necessary.*

SECTION - I

Q1) a) Explain different types of electrodes to measure bio signals.   **[9]**

   b) Which are commonly used transducers for bio signal measurement explain them.   **[9]**

OR

Q2) a) What is motion artifacts? Explain different types of motion artifacts. **[9]**

   b) Explain with block diagram Man-Machine interface of biomedical system. Give examples.   **[9]**

Q3) a) What are different methods of blood flow measurement? Explain any one in details with necessary diagram.   **[8]**

   b) What is blood pressure explain any one method to measure blood pressure with waveform.   **[8]**

OR

Q4) a) Explain the Einthoven triangle and how it is used in interpreting the ECG waveform.   **[8]**

   b) Draw and explain ECG amplifier to measure output at lead-II configuration.   **[8]**

Q5) a) Explain the concept of vector cardiography with typical loop pattern recorded in three planes.   **[8]**

   b) Explain terms :   **[8]**

   i) Brady Cardia.
   ii) Brady rhythmia.
   iii) Tachycardia.

Q6) a) Explain basic requirements of implantable pace maker. Explain operation of ventricular synchronous demand pace maker. **[8]**

b) Explain guarding and shielding techniques used in hospitals. **[8]**

SECTION - II

Q7) a) Explain principle of SPO_2 measurement (Oximeter). **[9]**

b) How WBCs and RBCs are separated in blood cell counter. **[9]**

OR

Q8) a) Explain operation and use of spectro photometer. **[9]**

b) Explain working of blood gas analyzer with neat block diagram. **[9]**

Q9) a) Explain various EEG waveforms with their frequency and significance. **[8]**

b) Explain EEG amplifier. How analysis and diagnosis is done using EEG. **[8]**

OR

Q10) a) Draw structure of Neuron and explain any four parts in details. **[8]**

b) Explain 10 - 20 system for EEG with necessary diagram. **[8]**

Q11) a) Which are diseases those can be cured with Lasers. Explain them. **[8]**

b) What are X-RAYS? Which techniques are used in visulation of X-rays. **[8]**

OR

Q12) a) What is CT scan? What are components of X-ray system in CT scan machine. **[8]**

b) What is MRI Scanning? What are differences between MRI and CT Scan. **[8]**

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P1106

[4064] - 62

B.E. (Production Engg.)

ROBOTICS

(Sem. - II) (411090) (Elective - II) (2003 Course)

Time : 3 Hours] *[Max. Marks :100*

Instructions to the candidates:

1) *Attempt Q1 or Q2, Q3 or Q4, Q5 or Q6 from Section I and Q7 or Q8, Q9 or Q10. Q11 or Q12 from Section II.*

2) *Answers to the two sections should be written in separate books.*

3) *Neat diagrams must be drawn wherever necessary.*

4) *Figures to the right indicate full marks.*

SECTION - I

Q1) a) Explain the following terms associated with robot: **[8]**

    i) Robot Work Envelop.

    ii) Accuracy.

    iii) Repeatability.

    iv) Payload capacity. θ

  b) Explain the six degrees of freedom associated with the manipulator. **[8]**

<div align="center">OR</div>

Q2) a) Define Robot. Explain with time period the development process in each robot generation. **[8]**

  b) Find the worst spatial resolution of a spherical robot with 600 mm arm length. The robot is equipped with three encoders emitting 1200 pulses per revolution. The linear axis is actuated with the aid of 200 mm pitch lead screw having the encoder mounted on it. **[8]**

Q3) a) For a pick and place type of robot, the link parameters table is given below:

i	α_{i-1}	a_{i-1}	d_i	$_i$
1	0	0	0	30º
2	−90	0	2	0º
3	0	5	0	90º

Determine the location of the end point of the link 3 with respect to the base. **[8]**

b) Explain the forward kinematics associated with planar 3R manipulator.**[8]**

OR

Q4) a) For a pick and place type of robot, the link parameters table is given below:

i	α_{i-1}	a_{i-1}	d_i	θ_i
1	0	0	0	45°
2	−90°	0	2	−90°
3	0	3	0	60°

Determine the location of the end point of the link 3 with respect to the base. **[8]**

b) Explain the Inverse kinematics associated with planar 3R manipulator.**[8]**

Q5) a) Describe Force and Torque sensors used in robot. **[8]**

b) Explain the concept of low vision and high vision associated with robot vision system. **[10]**

OR

Q6) a) With neat sketch explain any two electro-mechanically actuated grippers. **[8]**

b) The following data represent a 8 X 8 array of pixel. Each element in array indicates the gray level of pixel.

10	17	19	17	19	17	19	12
13	17	19	18	19	19	18	13
14	15	11	19	19	15	10	14
13	10	11	20	20	11	11	13
12	12	12	20	21	12	11	12
11	12	12	19	19	12	10	12
12	18	18	18	19	18	20	11
12	19	19	18	19	20	22	12

Convert it into black and white image. **[10]**

SECTION - II

Q7) a) Explain the lead through programming method used in robots. **[8]**

b) How intelligence can be incorporated in robots. **[8]**

OR

Q8) a) Explain 'WAIT', 'DELAY', 'SIGNAL', 'DEPART' commands. **[8]**

b) Describe the structure of any robot programming language with example.

[8]

Q9) a) With neat sketch explain interfacing of robot with PC. **[8]**

b) Describe the following applications of robot: **[8]**

i) Arc welding

ii) Machine loading and unloading.

OR

Q10) a) What is handshaking? Explain hardware handshaking of robot. **[8]**

b) What do you understand from robot economics? **[8]**

Q11) Write a note on: **[18]**

a) Walking robots.

b) Distance controlled robots.

OR

Q12) Write a note on: **[18]**

a) Underwater robots.

b) Robots used in mines.

P1109

[4064]-161

B.E. (Printing)

COSTING, ESTIMATING AND PROJECT MANAGEMENT AND OPERATION RESEARCH

(2003 Course) (408282) (Sem. - I)

Time : 3 Hours]   *[Max. Marks : 100*

Instructions to the candidates:

   1) *All questions are compulsory.*

   2) *Assume suitable data, if necessary.*

   3) *Answers to the two sections should be written in separate answer books.*

   4) *Neat diagrams must be drawn wherever necessary.*

   5) *Figures to the right indicate full marks.*

SECTION - I

Q1) Prepare a cost sheet from the following data :   **[16]**

ABC Pvt. Ltd., a stationery manufacturing company, produces two types of items, as A-for the school and B-for the office. From the following available, prepare cost sheet for the item A and B.

Direct material   -   A : 27,300/-   B : 97,850/-
Direct labour   -   A : 15,600/-   B : 61,800/-
Direct expenses -   A : 6,240/-   B : 26,780/-

Factory overheads are charged at 75% on labor cost. Administrative overheads are charged at 25% on factory cost. Selling and distribution overheads A : 25/- and B : 55/- per unit profit : 10% for both the items. Items sold A : 78 and B : 206.

OR

Comment on any two of the following :   **[16]**

   a) Marginal cost.

   b) Standard cost.

   c) Product cost.

   d) Process cost.

Q2) Explain the term Globalization with respect to Printing Industry.   **[16]**

OR

Explain in detail the elements of Direct and Indirect costs with suitable examples.   **[16]**

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Q3) How to ensure the quality of the project? Explain with the suitable example.

[18]

OR

What is Project Management? Explain all the facets of Project Management.

[18]

SECTION - II

Q4) Consider a project consisting of 12 activities with following precedence relationship and durations. **[16]**

Activity	A	B	C	D	E	F	G	H	I	J	K	L
Immediate Predecessor	-	-	A	A	A	D	C	D	E,F	B,I	G,H	J,K
Duration (weeks)	4	8	2	4	9	1	7	3	2	2	5	4

a) Draw network diagram and find the critical path.

b) List the total float, free float and independent float for all activities.

OR

The time estimates (in weeks) for the activities of a PERT network are given below : **[16]**

Activity	T_o	T_m	T_p
1 - 2	1	1	7
1 - 3	1	4	7
1 - 4	2	2	8
2 - 5	1	1	1
3 - 5	2	5	14
4 - 6	2	5	8
5 - 6	3	6	15

a) Draw the project network and determine expected project length.

b) Calculate the Std. Dev. And variance of the project.

c) What is the probability that project will be completed no more than 4 weeks earlier than expected time.

d) If the project due date is 19 weeks, what is the probability of not meeting the due date.

Given data :   Z = 1.33, P = 0.9082
                 Z = 0.67, P = 0.7486
                 Z = 1.28, P = 0.9

Q5) $Z_{min} = 12x_1 + 20x_2$
Subjected to, $6x_1 + 8x_2 > 100$

$7x_1 + 12x_2 > 120$

$x_1, x_2 > 0$ **[16]**

OR

$Z_{max} = 10x_1 + 20x_2$
Subjected to, $3x_1 + 2x_2 < 1200$

$2x_1 + 6x_2 < 1500$

$X_1 < 350$

$X_2 < 200$ **[16]**

Q6) a) Find the job sequence that minimize the total time in sequence A, B, C and find Idle time for m/c A and m/c C. **[8]**

Job	1	2	3	4	5
Machine A	8	10	6	7	11
Machine B	5	6	2	3	4
Machine C	4	9	8	6	5

b) Find the minimum transportation cost. **[10]**

	1	2	3	4	Supply
A	4	6	8	13	50
B	13	11	10	8	70
C	14	4	10	13	30
D	9	11	13	8	50
Demand	25	35	105	20	

OR

a) Solve the Assignment problem. **[10]**

	I	II	III	IV	V
1	11	17	8	16	20
2	9	7	12	6	15
3	13	16	15	12	16
4	21	24	17	28	26
5	14	10	12	11	13

b) Derive the relation of EOQ for Inventory Model. **[8]**

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P1112

[4064]-272
B.E. (IT)
ADVANCED DATABASE MANAGEMENT
(2003 Course) (414442) (Sem. - I)

Time : 3 Hours]   *[Max. Marks : 100*

Instructions to the candidates:

    1)   *Section I : Q1 or Q2, Q3 or Q4, Q5 or Q6.*
    2)   *Section II: Q7 or Q8, Q9 or Q10, Q11 or Q12*
    3)   *Answers to the two sections should be written in separate books.*
    4)   *Neat diagrams must be drawn wherever necessary.*
    5)   *Assume suitable data, if necessary.*

SECTION - I

Q1) a) Explain Server system Architectures.   **[12]**

      b) Write a short note on Partitioned Parallel Hash Join.   **[5]**

<div align="center">OR</div>

Q2) a) Explain Parallel Database System design issues.   **[12]**

      b) Write a short note on Parallel Query Optimization.   **[5]**

Q3) a) Explain Synchronous and Asynchronous Replication in Distributed Databases.   **[5]**

      b) State different types of failures in distributed systems and explain failure handling in distributed database using 2Phase Commit protocol 1.   **[7]**

      c) Write a short note on Persistent Messaging in Distributed Transaction processing.   **[5]**

<div align="center">OR</div>

Q4) a) Write a short note on Bully Algorithm.   **[5]**

      b) Explain various approaches to achieve high availability in distributed databases.   **[7]**

      c) Explain any two algorithms to handle distributed deadlock in distributed databases.   **[5]**

Q5) a) Describe different techniques of storage of XML Data. **[8]**

b) Consider the following nested relational schema **[8]**

Emp = (ename, childrenset setoff(children), skillset setoff(skills)
Children = (name, birthday), Birthday = (day, month, year)
Skills = (type, Examset setoff(Exams)), Exams = (year, city)

Answer the following

i) Write DTD and XML file.
ii) Write a query in XPath to list all skill types in Emp.
iii) Find the names of all the employees who have a child who has a birthday in March.
iv) Find the those employees who took an examination for the skill type "typing" in the city "Pune".
v) List all skill types in Emp.

OR

Q6) a) Explain three tier Web architecture in detail. State advantages of three tier architecture. **[8]**

b) Write short notes on : **[8]**
i) Axes of XPath.
ii) Web services.

SECTION - II

Q7) a) Explain ETL process in Data Warehouse. **[5]**

b) One of the advantages of Data Warehouse is that we can use it to track how the contents of a relation change over time; in contrast, we have only the current snapshot of a relation in a regular DBMS. Discuss how you would maintain history of a relation R; taking into account that 'old' Information must somehow be purged to make space for new information. **[5]**

c) Design snowflake and Starflake schemas for sales of product system. **[7]**

OR

Q8) a) Write a short notes on : **[10]**
i) OLAP.
ii) Materialized View.

b) Describe Kimball's nine steps for Data Warehouse design. **[7]**

Q9) a) Explain the splitting criteria and pruning process for decision tree construction with suitable example. **[7]**

b) Write a short note on : **[10]**
   i) Bayesian Classifier.
   ii) Text Ming.

<div align="center">OR</div>

Q10) a) Explain Data Mining preprocessing. **[7]**

b) Describe different types of Clustering Techniques with suitable example. **[5]**

c) Write a short note on Web Mining. **[5]**

Q11) a) Explain any two techniques that support the evaluation of Boolean and Ranked queries. **[8]**

b) Explain different factors for relevance ranking in information retrieval system. **[8]**

<div align="center">OR</div>

Q12) a) Explain different Indexing of Documents approaches. **[8]**

b) Define Information Retrieval System. Describe how it is differ from database system. **[8]**

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P1113

[4064]-274

B.E. (I.T.)

BIOINFORMATICS

(414445) (2003 Course) (Elective - I) (Sem. - I)

Time : 3 Hours]   *[Max. Marks : 100*

Instructions to the candidates:

    1) Answers to the two sections should be written in separate answer books.
    2) Neat diagrams must be drawn wherever necessary.
    3) Assume suitable data if necessary.
    4) Figures to the right indicate full marks.

SECTION - I

Q1) Explain the role of 'User Interface' in Information Theory? Explain in detail User Interface Components with associated Hierarchy? Explain why user interface is a major bandwidth-limiting element in delivery of data from application to the user. **[18]**

OR

The probability of a patient having a particular genetic disease is 0.8. Calculate the pretest odds? If the Likelihood ratio is given as 1.35, calculate the post-test odds? Find the probability of the patient suffering from the genetic disease? Explain Bayes' Theorem in detail? **[18]**

Q2) Explain any four of the following : **[16]**

    a) Neural Networks.

    b) Hidden Markov Models.

    c) Genetic Algorithms.

    d) Decision Trees.

    e) Sequence Visualization.

    f) Sequence Maps.

    g) Gene Mapping Process.

Q3) What is the difference between Clustering and Classifying? Explain Hierarchical Clustering. Explain K-means clustering. Explain any one classification technique? **[16]**

OR

a) For the given fluorescence data as $xl[n]$ in the table below, calculate mean, standard deviation and variance? **[8]**

n	1	2	3	4	5	6	7
$x1[n]$	2.2	8.6	3.4	3.3	5.7	1.3	4.8

n	1	2	3	4	5	6	7
$x2[n]$	12.2	18.6	8.4	13.3	52.7	81.3	44.8

b) For Given $xl[n]$ and $x2[n]$ calculate True Positives, True Negatives, False Positives and False Negatives? **[4]**

c) Explain the concept of Sensitivity and Specificity along with the formulae. **[2]**

d) Explain the concept of Receiver Operating Characteristics? **[2]**

SECTION - II

Q4) a) Explain the Central Dogma of Molecular Biology. **[10]**

b) Explain Inductive Logic Programming and Deductive Logic Programming along with the differences between the two? **[8]**

OR

a) For the given two nucleotide sequences calculate the alignment score. Use gap penalty of (-0.5) per gap. Assuming opening cost and extension cost of (-0.5) each calculate the penalty gap, using this also calculate expanded gap penalty. **[12]**

      Sequence 1: ATTCGGCATTCAGAGCTAGA
      Sequence 2 : ATTCGACATT ----GCTAGTGGTA

b) Given A = [2 3 8 4 1] and B = [9 11 1 0 2 4 5 6 5 3 4], calculate MaxValue = $f(A_1, B_i)$, where, i = 1, 2, ..., 11. **[6]**

Q5) Explain in detail – FASTA algorithm for database search with an example. **[16]**

OR

a) BLAST and FASTA are two widely used tools for sequence alignment. Explain only the differences in their approaches? **[8]**

b) Discuss the applications of PSI-BLAST program exploring protein family relationships? **[8]**

Q6) a) What is Genetic Engineering? Explain Genetic Markers. What are the dangers of genetic engineering? **[8]**

b) Explain the process of interchange and transformation of pollutant in atmosphere, hydrosphere and lithosphere. **[8]**

OR

Explain Punnet Squares using the underlying probabilistic principles? Explain how the relative probability of a genotype relates to a given genotype mating. Explain Mendelian genetics? **[16]**

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P1115

[4064]-411

B.E. (Civil)

TQM AND MIS IN CIVIL ENGINEERING

(2008 Course) (Elective - II) (401005C) (Sem. - I)

Time : 3 Hours]   *[Max. Marks : 100*

Instructions to the candidates:

1) *Answer Q1 or Q2, Q3 or Q4, Q5 or Q6 from Section I and Q7 or Q8, Q9 or Q10, Q11 or Q12 from Section II.*
2) *Answers to the two sections should be written in separate answer books.*
3) *Neat diagrams must be drawn wherever necessary.*
4) *Figures to the right indicate full marks.*
5) *Use of logarithmic tables, slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.*
6) *Assume suitable data, if necessary.*

SECTION - I

Q1) Explain any 3 definitions of quality and elaborate with examples why TQM is necessary in the construction sector.   **[3 + 15]**

OR

Q2) Explain project-influence-cost relationship with a diagram and hence explain why best quality is always cheaper than poor quality of construction, with practical examples.   **[6 + 12]**

Q3) Dry lean concrete (DLC) layer is to be checked for quality assurance on a road project. Develop a rating system on a 3 point or 5 point scale for including various sub-activities involved in the construction of (DLC). Explain importance of such a rating system.   **[13 + 3]**

OR

Q4) Explain the 8, ISO 9001 principles with practical examples.   **[16]**

Q5) a) Fine cracks of average width 3 "mm" and average depth 6 "cm" were noted in the following sections of road made in PQC.

Sr. No.	Road length (m)	Defected Length (m)
1	100	20
2	200	15
3	150	45
4	75	25
5	150	45
6	80	10
7	120	25

i) Identify the type of construction defect.

ii) Work out sigma level of PQC.

iii) Work out the cost of poor quality if the PQC cost is Rs. 5000/- per cubic meter. Assume suitable material rates, labour rates, T&P cost and labour output as required. **[12]**

b) Explain salient features of the PRRT software used in construction quality monitoring. **[4]**

OR

Q6) a) Explain various types of construction defects as are classified, with examples. **[8]**

b) Classify various sigma levels and explain how six sigma tool and benchmarking concept help in improving quality, with examples. **[8]**

SECTION - II

(Management Information System)

Q7) a) Explain with suitable examples from construction industry the difference between DATA and INFORMATION. **[5]**

b) Enlist and explain important characteristics of an efficient and effective Management Information System (MIS). **[5]**

c) What do you mean by decision making process? Usually project managers have to take strategic decisions, tactical decisions and operational decisions. Enlist examples of each type of decision with respect to construction industry. **[7]**

OR

Q8) a) Explain in detail with suitable examples structured decisions and unstructured decisions. **[6]**

b) MIS is an important tool helping project managers to make appropriate decisions. Explain this statement in context of procurement of construction equipments. **[6]**

c) Explain in detail the development of MIS for a business organization.**[5]**

Q9) a) Explain what you understand by Functional MIS. Explain any one type of Functional MIS in detail. **[5]**

b) The successful implementation and operation of MIS depends on type of the organization structure. Discuss at length for which type of organization MIS can be successfully implemented and operated. **[5]**

c) MIS is essentially a computer based system. MIS for a construction project would require networking amongst various stakeholders of the project. Discuss which type of computer network would you suggest for use of MIS in the project. **[7]**

OR

Q10) a) Discuss the potential limitations of computers in MIS operations. **[5]**

b) Explain the role of MIS in following case : **[8]**

A reputed Indian construction company intends to bid for an international project. Based on limited financial resources company has two options:

i) Enter into a Joint Venture with an international construction conglomerate and bid for the project.

OR

ii) Enter into partnership with its Indian counterpart and bid for the project.

How will MIS help the top management of the organization to take appropriate decision.

c) Design a MIS for quality control of construction materials. **[4]**

Q11) a) Construction industry in India is still labour intensive. Justify the need of costly MIS for streamlining construction operations. **[6]**

b) Timely supply of appropriate information may help business organizations in taking right decisions. Explain this statement with suitable examples.**[5]**

c) Explain the role of MIS in tendering and bidding process. **[5]**

<div align="center">OR</div>

Q12) Write short notes on :　　　　　　　　　　　　　　　　　　　　　　　**[16]**

　　　a) Database management.

　　　b) Information security system.

　　　c) Manual control and MIS based control of construction operations.

　　　d) ERP software.

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P1116

[4064]-413

B.E. (Civil)

ADVANCED CONCRETE TECHNOLOGY

(2008 Course) (Elective - II) (401005(E)) (Sem. - I)

Time : 3 Hours]   *[Max. Marks : 100*

Instructions to the candidates:

1) *Answer three questions from SECTION I (Que. 1 or 2, Que. 3 or 4, Que. 5 or 6) and answer three questions from SECTION II (Que. 7 or 8, Que. 9 or 10, Que. 11 or 12).*
2) *Answers to the two sections should be written in separate books.*
3) *Neat diagrams must be drawn wherever necessary.*
4) *Figures to the right indicate full marks.*
5) *Your answer will be valued as whole.*
6) *Assume suitable data, if necessary.*
7) *Use of electronic pocket calculator is allowed.*
8) *IS 10262 is not allowed.*

SECTION - I

Q1) a) Explain the history and development of cement as a binding material.**[6]**

   b) Explain the water requirement for hydration of cement.   **[6]**

   c) Differentiate between rapid hardening cement and low heat cement. **[6]**

OR

Q2) a) Draw and explain the use of grading curves of aggregate.   **[6]**

   b) Explain characteristics of aggregates as a concrete making material. **[6]**

   c) Explain alkali aggregate reaction.   **[6]**

Q3) a) Name and explain any four types of light weight concrete.   **[8]**

   b) Explain the following terms :   **[8]**
   i)   Shotcreting.
   ii) Guniting.
   iii) Segregation and
   iv) Bleeding.

OR

Q4) a) Explain: **[4]**

    i)   Mass concrete.

    ii)   Jet cement concrete.

  b) Write a note on compaction of concrete. **[4]**

  c) Explain: **[8]**

    i)   Sulphur concrete and sulphur infiltrated concrete.

    ii)   High strength concrete and high performance concrete.

Q5) a) Using any method, design the fly ash cement concrete mix M25 for following data. **[10]**

Target mean strength-33 MPa,

Maximum size of crushed aggregate - 20 mm,

Slump -30 to 60 mm,

Exposure - moderate,

Concrete cover -25mm,

Fly ash to be used -25%

Assume following data :

- Specific gravity of OPC is 3.15 and that of aggregates is 2.65.
- Compressive strength of cement(C) with fly ash(F) is 49 MPa at $W/(C+F)$ as 0.5
- For target mean strength of concrete of 33MPa, $W/(C+F)$ is 0.65.
- Water content for assumed crushed aggregate of 20 mm size and a slump of 30 to 60 mm is 210 kg/m^3.
- Reduction in water content for use of fly ash is 20%,
- For assumed exposure and concrete cover, $W/(C+F)$ ratio is 0.5 and cement content is 350 kg/m^3.
- Fine aggregate as 40% and no entrapped air in concrete.

  b) Enlist the any four advanced methods of NDT. Explain any one of them.**[6]**

<div align="center">OR</div>

Q6) a) Using IS method, determine mix proportion for M20 concrete for following data : **[10]**

Target mean strength -26.6 MPa,

Slump-30 to 60 mm,

Size of aggregate -20 mm,

Compaction factor -0.9,

Quality control-good,

Exposure -mild($W/C = 0.5$)

Cement satisfy the requirement of strength

CA confirm to table 2 and Fine aggregate confirm to Zone II of IS 383.

Specific gravity of OPC and aggregates is 3.15 and 2.6 respectively.

Water absorption for CA and FA is 0.5% and 1% respectively.

Moisture content for CA and FA is 0.0% and 2% respectively.

W/C ratio for target mean strength - 0.5.

For Sand confirming zone II, Water content is 186 kg/m³ and sand content as 40%.

Entrapped air as 2%.

b) Calculate the quantities of ingredient required to produce 1m³ of concrete of proportion 1 : 1.5: 2.8 with w/c ratio as 0.5. Bulk densities of cement, sand and aggregate are 1500, 1700 and 1600 kg/m³ respectively. Assume Entrapped air as 2%. **[6]**

SECTION - II

Q7) a) Explain the historical development of fiber reinforced composite/concrete (FRC). **[6]**

b) Enlist different metallic fibers. Explain their any two properties in brief. **[6]**

c) Explain concept of interaction between fiber and matrix in uncracked condition. **[6]**

OR

Q8) a) Explain carbon fiber and glass fiber. **[6]**

b) Enlist different naturally occurring fibers. Explain any two in brief. **[6]**

c) Explain concept of interaction between fiber and matrix in uncracked condition. **[6]**

Q9) a) Enlist different properties of hardened FRC. Explain and two properties. **[8]**

b) Explain the behaviour of SFRC under compression, tension and flexure. **[8]**

OR

Q10) a) Describe the SIFCON material with reference to: definition, structure, properties and use. **[8]**

b) Explain the quality control test related to FRC. **[8]**

Q11) a) Explain the construction and use of a precast concrete pole with reference to following : **[8]**
- Analysis and design principals
- Testing methodology
- A material required along with specification
- Quality control
- Manufacturing method with flow chart

b) Explain the product fibrocement with reference to following : **[8]**
- Analysis and design principals
- Testing methodology
- A material required along with specification
- Quality control
- Manufacturing method with flow chart
- Use in Civil Industry

OR

Q12) a) Explain the precast construction products with reference to following:**[8]**
- History and development
- Erection & Assembly
- Classification & different product
- Quality Control (Laboratory & field)

b) Explain the construction of bridge (segmental or girder) using precast concrete elements. **[8]**

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P1121

[4064]-447

B.E. (Production - S/W)
MECHATRONICS & ROBOTICS
(2008 Course) (411122) (Sem. - I)

Time : 3 Hours]   *[Max. Marks : 100*

Instructions to the candidates:

1) *Answers to the two sections should be written in separate answer books.*
2) *Neat diagrams must be drawn wherever necessary.*
3) *Figures to the right indicate full marks.*
4) *Use of logarithmic tables slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.*
5) *Assume suitable data, if necessary.*

SECTION - I

Q1) a) Define Mechatronic. What is scope & importance of Mechatronic? State the application of Mechatronic.   **[8]**

b) What are the basics elements of closed loop control system. Explain with example.   **[10]**

OR

a) Write a short note on signal Conditioning.   **[6]**

b) Explain the Data Acquisition System with neat sketch.   **[6]**

c) Explain the following :   **[6]**
   i)   Summing Amplifier.
   ii) Integrating Amplifier.

Q2) a) Explain with neat sketch 8085 with labeled pins explain any four pin in detail.   **[8]**

b) What are different addressing modes of 8085? Explain.   **[8]**

OR

a) What are different registers used in 8085. Explain.   **[8]**

b) Define the following :   **[8]**
   i)   TTL.
   ii)   CMOS.
   iii) Digital Logics.
   iv)   Parity method foe error detection.

Q3) a) Explain the need of interfacing and explain the series and parallel interfacing in brief. **[8]**

b) Explain the following command with example. **[8]**
   i) MVI.
   ii) ADD.
   iii) DAA.

OR

a) Write a program foe subtraction of two 8-bit number. Also draw the flow chart for it. **[8]**

b) Compare interfacing of computer and printer with that of computer and CNC. **[8]**

SECTION - II

Q4) a) Explain the basic structure of PLC. **[6]**

b) Explain the importance of ladder diagram. **[4]**

c) Draw the ladder diagram for an engine "ON" and kept running till stopped by pressing a button. **[8]**

OR

a) Explain the following w.r.t. to Fluid pressure sensor. **[8]**
   i) Diaphragms.
   ii) Capsules.
   iii) Bellows.
   iv) Tube pressure Sensors.

b) Draw the schematics diagram of bottle filling plant and draw Ladder Diagram for the same. **[10]**

Q5) a) Classify and explain the A.C. motors. **[6]**

b) Explain the process control valve. **[4]**

c) Explain the following mechanism. **[6]**
   i) Rack and Pinion.
   ii) Reserved Belt drive.

OR

a) Design the mechanical system which can be used. **[6]**
   i) Transform a rotation through some angle into a linear displacement.
   ii) Operated sequence of micro switches in a timed sequence.

b) A car board weighing 5 kg is held in a gripper using friction against two opposing fingers. The coefficient of friction is 0.25. The weight of the carton is directed parallel to the finger surface. Calculate required gripper force for the condition given and if shear force value will be 1.5 what would be value of gripper force. **[10]**

Q6) a) Explain the classification Robot. **[4]**

b) Explain following : **[6]**
   i) Work envelope.
   ii) Accuracy.
   iii) Resolution.

c) What is pay load? How it will affect design of a robot. **[6]**

OR

a) Explain grippers used in robot. Which types of actuators used in robot Grippers. **[6]**

b) Discuss in detail the essential features of robot in following application. **[10]**

   i) Loading and Unloading.
   ii) Spray Coating.
   iii) Welding (Spot).

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P1125

[4064]-476

B.E. (Electronics)
VLSI DESIGN
(404202) (2008 Course) (Sem. - I)

Time : 3 Hours]   *[Max. Marks : 100*

Instructions to the candidates:

    1) Question Nos.1 and 6 are compulsory. Out of the remaining attempt 2 questions from Section I and 2 questions from Section II.

    2) Answers to the two sections should be written in separate books.

    3) Neat diagrams must be drawn wherever necessary.

    4) Figures to the right indicate full marks.

    5) Use of logarithmic tables slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.

    6) Assume suitable data, if necessary.

SECTION - I

Q1) a) Design CMOS combo logic for $= \overline{A(D+C)+BC}$. **[6]**

    b) Prove that to achieve completely symmetric input-output characteristics for a CMOS inverter, the design requires to have $\left(\dfrac{W}{L}\right)_p \approx 2.5\left(\dfrac{W}{L}\right)_n$. Assume that the gate oxide thickness t_{ox}, and hence, the gate oxide capacitance C_{ox} have the same value for both NMOS and PMOS transistors. $\left(\text{Given: } \mu_p = 230\dfrac{cm^2}{V.s} \text{ and } \mu_n = 580\dfrac{cm^2}{V.s}\right)$ **[6]**

    c) What is technology scaling? Explain its types and effects on power dissipation of a MOSFET. **[6]**

Q2) a) Draw the schematic of SRAM cell with necessary peripherals & explain read/write cycles with the help of timing diagrams. **[8]**

    b) Classify semiconductor memories in details. Comment on the selection of memory, based on applications. **[8]**

Q3) a) Explain the power-delay product for a CMOS inverter and state its significance. **[8]**

b) Explain the CMOS Transmission Gate in details. Design a 4 : 1 multiplexer using CMOS Transmission Gates. **[8]**

Q4) a) Draw the VHDL based digital design flow and explain the various design steps in detail. Enlist various tools used at each step. **[8]**

b) Write a function using VHDL code to detect the (positive) rising edge of a clock. Where will you place this function in the main code? **[8]**

Q5) a) Explain metastability and its effects on the circuit performance. What are the techniques for minimizing metastability? **[8]**

b) Explain the state encoding techniques employed in FSM design. Comment on the choice of flip-flops. **[8]**

SECTION - II

Q6) a) Explain the basic building block used in the architecture of a CPLD with a neat figure. **[6]**

b) Compare and contrast CPLD & FPGA in detail. **[6]**

c) Explain popular logic realization techniques utilized in the programmable logic blocks in FPGAs. **[6]**

Q7) a) What are different fault models? Explain in detail. **[8]**

b) What is BIST? Explain the block diagram of BIST architecture in detail. **[8]**

Q8) a) Draw the block diagram of TAP controller & explain in detail. **[8]**

b) Explain the terms : observability, controllability, predictability and testability? **[8]**

Q9) a) What are techniques of EMI immune chip design? How to achieve EMC? **[8]**

b) What are the various sources of noise on the power grid? Explain their effect on power grid and various techniques to minimize these effects. **[8]**

Q10) Write notes on (anytwo) **[16]**

a) Boundary Scan Description Language.

b) Clock Distribution techniques.

c) Coarse and Fined grained FPGA architectures.

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P1126

[4064] - 479

B.E. (Electronics)

ADVANCE POWER ELECTRONICS

(2008 Course) (Sem. - I) (Elective - I) (404204 B)

Time : 3 Hours]   *[Max. Marks : 100*

Instructions to the candidates:

    1)   *Answers 3 questions from Section - I and 3 questions from Section - II.*

    2)   *Answers to the two sections should be written in separate answer books.*

    3)   *Neat diagrams must be drawn wherever necessary.*

    4)   *Figures to the right indicate full marks.*

    5)   *All question carry equal marks.*

    6)   *Your Answer will be valued as a whole.*

    7)   *Use of logarithmic tables slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.*

    8)   *Assume suitable data, if necessary.*

SECTION - I

Q1) a)   What are series converters? Explain with circuit diagram & waveform, working of single phase series converter with inductive food. Comment on power factor.   **[8]**

    b)   How do you use full controlled converter as a semiconverter?   **[3]**

    c)   Explain the need of 12 pulse converter in industrial applications.   **[5]**

OR

Q2) a)   What is the need of PWM technique in converter circuits? Explain with circuit diagram, 3ϕ IGBT based PWM rectifier with suitable load. Comment on Harmonics & P.F.   **[10]**

    b)   What is power conditioning of diode rectifier? Explain in brief.   **[6]**

Q3) a)   What is PLL? Explain with block diagram speed control of DC motor using PLL for varying load conditions. State its advantages & disadvantages.   **[10]**

    b)   What is cyclo converter? Explain 1ϕ to 1ϕ cycloconverter with circuit diagram & waveforms.   **[6]**

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Q4) a) What is AC drive? Explain with block diagram speed control technique of single phase Induction motor by using $\frac{v}{f}$ method. Comment on Tq & speed characteristics. **[10]**

b) What is adaptive control? Explain in brief. **[6]**

Q5) a) What are Multi level inverters? Explain with circuit diagram switching of Multi-level inverter. State its advantages & dis-advantages. **[10]**

b) Explain, selective Harmonic elimination technique for Multi-level inverters. **[8]**

OR

Q6) a) What are different types of advanced modulation techniques used in inverters? Explain any one type. **[8]**

b) What are variable DC link inverter? Explain double bridge Resonant DC link converter with variable i/p & o/p frequency. **[10]**

SECTION - II

Q7) a) What are Resonant converters? Explain the concept of soft switching in ZVS. **[8]**

b) What are Low drop out regulators? Explain. **[4]**

c) What is bidirectional switch? Explain in brief. **[4]**

OR

Q8) a) Compare Linear, switched mode & resonant converters. **[6]**

b) What is ZCS? Explain with circuit diagram & waveform working of ZCS. **[10]**

Q9) a) What is the role of power electronics in Renevable energy sources? Explain in brief. **[6]**

b) What are traction on drives? Explain. **[6]**

c) How choppers are useful in variable wind energy conversion system?**[6]**

*Q10)*a)   What are battery powered drives? Explain.   **[6]**

   b)   Explain in brief photovoltalic energy conversion system.   **[6]**

   c)   What is microcontroller based De drive? Explain.   **[6]**

*Q11)*a)   What is power quality? Explain different type of power-line
            disturbances. State its remedies.   **[10]**

   b)   Explain in brief solar power conditioning.   **[6]**

OR

*Q12)*Write short notes on any three :   **[16]**
   a)   Flexible AC transmission.
   b)   HVDC.
   c)   Need of energy audit in large industries.
   d)   Z-source inverters.
   e)   Cascaded multi level inverters.

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[4064] - 484

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B.E. (Electronics)

SYSTEM ON CHIP

(404204(C)) (Elective - II) (2008 Course) (Sem. - I)

Time : 3 Hours]   *[Max. Marks :100*

Instructions to the candidates:

1) *Answer 3 questions from Section I and 3 questions from Section II.*
2) *Neat diagrams must be drawn wherever necessary.*
3) *Assume suitable data, if necessary.*

SECTION - I

Q1) a)   Explain basic working principal of accelerometer?   **[8]**

     b)   What do you mean by scaling in electrostatics forces?   **[8]**

OR

Q2) a)   What are performance parameters of Gyroscope?   **[8]**

     b)   Explain in detail necessary ingredients that will be involved in microsystem design.   **[8]**

Q3) a)   Compare GaAs Vs Silicon.   **[8]**

     b)   Explain in detail materials used in microsystems.   **[8]**

OR

Q4) a)   Explain working principal, advantage and disadvantage of Piezoresistive microaccelerometers?   **[8]**

     b)   Explain the concept of: **[8]**

         i)   Mobility

         ii)   Resistivity in context to Piezo crystal.

Q5) a)   Explain working principal of chemical sensors.   **[9]**

     b)   Explain various technological aspects of sensors.   **[9]**

OR

Q6) a) Explain how biosensor is used for glucose concentration? **[9]**

b) Explain in general optical and optical silicon properties. **[9]**

SECTION - II

Q7) a) Explain SoC architecture in detail. What are advantages of SoC design over VLSI design? **[8]**

b) Explain in detail schematic of an MPEG2 encoder for terrestrial transmission. **[8]**

OR

Q8) a) What are the important parameters which define wafer level bonding? Also give its significance? **[8]**

b) Explain in detail new ways for speeding up execution of instructions.**[8]**

Q9) a) Which features of designer should look in layout synthesis tool? **[8]**

b) Explain working of CVD? Which new CVD process is used to overcome drawbacks of CVD process? **[8]**

OR

*Q10)*a) Explain advantages and disadvantages of SCCGS. **[8]**

b) Which different strategies are used in power supply distribution and body-tie placement? **[8]**

*Q11)*a) Explain the terms: **[9]**
    i)   Defects and fault method.
    ii) Fault simulation.

b) Explain in detail UBIST. **[9]**

OR

*Q12)*a) Which features are inculcated in co-design tool? Explain design steps for co-design. **[9]**

b) What are the issues in testing of core based systems on chip? **[9]**

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P1130

[4064] - 513

B.E. (Instrumentation & Control)
NANO INSTRUMENTATION

(406265(B)) (2008 Pattern) (Elective - II) (Sem. - I)

Time : 3 Hours]   *[Max. Marks :100*

Instructions to the candidates:

    1)   *Answers to the two Sections should be written in separate books.*

    2)   *Neat diagrams must be drawn wherever necessary.*

    3)   *Figures to the right indicate full marks.*

SECTION - I

Q1) Write short notes on the following:

    a)   Ballistic Transport of electrons in a medium.   **[6]**

    b)   Energy subband structure of a quantum well.   **[6]**

    c)   Steps involved in chemical vapor deposition technique.   **[6]**

OR

Q2) Write short notes on the following:

    a)   The concept of 'density of States'.   **[6]**

    b)   The 'top-down' and 'bottom-up' approaches for nanofabrication. **[6]**

    c)   The Langmuir - Blodgett technique.   **[6]**

Q3) a)   Explain briefly the physical principle underlying the working of an Atomic Force Microscope.   **[8]**

    b)   Discuss various modes of operation of a Scanning Tunneling Microscope.   **[8]**

OR

Q4) a)   Describe working of a Scanning Near-field Optical Microscope.   **[8]**

    b)   State and explain the main types of interatomic forces involved in the tip-sample interaction of an atomic force microscope.   **[8]**

Q5) a)   Examine the features of carbon nanotubes and fibers that makes them good microwave absorbing materials.   **[8]**

    b)   Compare the field emission-based devices using CNT versus metallic electron emitting tips.   **[8]**

OR

Q6) a) What are the types of single - walled carbon nanotubes? How is it related to the chirality and the chiral angle θ and subsequently to the CNT diameter? **[8]**

b) Enlist the unique characteristics of carbon nanotubes that make them ideal candidates for numerous device applications. **[8]**

SECTION - II

Q7) a) Explain the primary processes involved in the dynamics of ensembles of spins used in a typical spintronic device. **[8]**

b) What is a 'Spin Transistor'? Describe its advantages over regular transistor. **[8]**

OR

Q8) a) Give qualitative explanation of the 'Giant Magneto - resistance Effect'.**[8]**

b) By using the Bloch sphere representation of quantum states of a spin ½ particle, explain how spin - based computers are different from computers based on regular transistors. **[8]**

Q9) a) Describe qualitatively the working of an FET as a genuine switch. How does the downscaling of MOSFETs affect their functioning? **[8]**

b) What are mesoscopic devices? Explain the working of a ballistic rectifier. **[8]**

OR

*Q10)*a) Describe single electron resonant tunneling by using a circuit involving a quantum dot coupled to source and drain leads. **[8]**

b) Draw a schematic diagram of a single electron transistor and explain its basic structure. **[8]**

*Q11)*Write short notes on the following:
   a) Nanotransducers vs. Conventional transducers. **[6]**
   b) Semiconducting nano-wires in LEDs and nano - lasers. **[6]**
   c) Single photon source based on a quantum dot. **[6]**

OR

*Q12)*Write short notes on the following:
   a) Chemically driven nanoactuators. **[6]**
   b) Plasmonic optical waveguide. **[6]**
   c) Multi-walled carbon nano-tube film as an optical antenna. **[6]**

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P1131

[4064] - 521
B.E. (Printing)
TECHNOLOGY OF GRAVURE
(2008 Course) (Sem. - I) (408283)

Time : 3 Hours]   *[Max. Marks : 100*
Instructions to the candidates:
   1)   Answers to the two sections should be written separately.
   2)   Draw neat diagram wherever necessary.

SECTION - I

Q1) a)   Explain in detail cylinder making by chemical etching process.   **[10]**

   b)   Compare between Etching and Engraving Process.   **[8]**

OR

Explain in detail electronic engraving of a Gravure cylinder.   **[18]**

Q2) Write notes on :   **[16]**
   a)   Dominant Image Carrier.
   b)   Role of Nickel and Chrome in cylinder making.

OR
Explain in detail the variables in plating process.   **[16]**

Q3) a)   Explain in detail Gravure Machine principles.   **[10]**

   b)   Mention the benefits and application of Gravure process.   **[6]**

OR

Write notes on :   **[16]**
   a)   Solvent based inks.
   b)   Water based inks.

Q4) Explain in detail the impact of viscosity on gravure print quality. **[18]**

OR

Explain the closed loop and open loop inking system of gravure press. **[18]**

Q5) a) Shore hardness plays a vital role in ink transfer. Explain. **[10]**

b) Explain the factors that govern the impression pressure. **[6]**

OR

Explain in detail loading system for impression roller. **[16]**

Q6) Explain in detail web tension control system for a Gravure press. **[16]**

OR

Write notes on (Any four) : **[16]**
a) Splicing mechanism.
b) Web aligner.
c) Corona Treatment.
d) Compensator roller.
e) Purpose of idle rollers.

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P1132

[4064]-522

B.E. (Printing)

DIGITAL IMAGING AND PRINTING

(2008 Course) (408284) (Sem. - I)

Time : 3 Hours]   *[Max. Marks : 100*

Instructions to the candidates:

1) *Solve 3 questions from each section.*
2) *Q1 & Q4 are compulsory.*
3) *Assume suitable data for Q6 if necessary.*

SECTION - I

Q1) What is Digital Printing? Also explain in brief various printing technologies stated under digital printing. **[18]**

OR

Explain any one digital technology in detail : **[18]**

a) Electrophotography.

b) Large format inkjet.

Q2) Discuss compressible and non compressible file formats and their Advantages/ disadvantages in detail with examples. **[16]**

OR

What is RAW file format? Discuss in detail with applications. **[16]**

Q3) a) State and explain various digital input devices.

b) Discuss DSLR in detail. **[16]**

OR

Discuss applications of image editing software for prepress. **[16]**

SECTION - II

Q4) Explain following printing technologies with applications : **[18]**

a) Magnetography.

b) Drop on demand.

c) Thermal dye sublimation.

OR

Explain in detail with example how a digital printing unit can be an added asset to a conventional printing press. **[18]**

Q5) What is Variable Data Printing? Explain in detail with examples. Also state advantages of VDP in conventional as well as digital printing. **[16]**

OR

Explain advantages of digital printing technology in comparison to Conventional printing with suitable practical examples. **[16]**

Q6) Calculate and state which one of the two printing processes are economical for current printing job out of conventional and digital printing: **[16]**

a) 4 page, 4 color brochure of A4 size, 250 gsm paper.

b) Calculate for : (i) 200 qty. (ii) 500 qty. (iii) 2000 qty.

c) Data : paper cost : Rs. 130/- per kg, digital printing : Rs. 20 per page, offset : Rs. 3500 per 1000 impressions.

OR

Calculate and state the quantity where conventional and digital printing cost will be at par and also state which printing process must be chosen and why.

a) One side printing of a 4 color A3 size Poster, 170 gsm paper.

b) Data: paper cost : Rs. 85/- per kg, digital printing : Rs. 20 per page, offset: Rs. 3500 per 1000 impressions. **[16]**

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[4064] - 524

B.E. (Printing)

QUALITY CONTROL TECHNIQUES IN PRINTING

(2008 Course) (Elective - I) (408281A) (Sem. - I)

Time : 3 Hours] *[Max. Marks : 100*

Instructions to the candidates:

1) *All questions are compulsory.*
2) *Answers to two sections should be written in SEPARATE books.*

SECTION - I

Q1) a) Explain Quality Cost concept in detail with examples of each type of Quality cost. **[16]**

b) Define Quality & Explain in detail Quality specification.

OR

a) Explain in detail the concept of Quality control with respect to Printing Industry.

b) Explain the concept Quality Inspection & Quality Challenges in Printing.

Q2) a) In a capacity study of a punching machine used in preparing the cartons, a sample of 5 consecutive pieces was taken each day for 5 days. The dimensions in mm of these cartons are given below. Construct X & R chart. State whether the machines is capable of meeting the tolerance or not. **[10]**

$A_2 = 0.58$, $D_3 = 0$, $D_4 = 2.11$

1st Day	2nd Day	3rd Day	4th Day	5th Day
23.80	23.78	23.78	23.78	23.56
23.77	23.76	23.76	23.70	23.76
23.79	23.78	23.77	23.77	23.74
23.75	23.79	23.73	23.74	23.72
23.78	23.80	23.75	23.76	23.79

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b) 10 samples each of size 50 of offset machine blowers were tested in pressure testing. The results of the inspection are given below. **[8]**

Sample No.	1	2	3	4	5	6	7	8	9	10
No. of Defectives	2	3	2	0	2	3	2	1	2	3

Draw P chart and state conclusion.

OR

a) Double sampling plan is as follows :
Select a sample of 2 from a lot of 20. If both the articles inspected are good, accept the lot. If both are defective, reject the lot. If one is good and one is defective, take a second sample of one article. If the article in second sample is good, accept the lot, if it is defective, reject the lot. If the lot of 20% defective is submitted, what is probability of acceptance of lot.

b) 10 printed samples of size 100 were studied critically for total number of defectives in it. The details of number of defectives in each sample are given below.

Sample No.	1	2	3	4	5	6	7	8	9	10
No. of Defect	2	1	1	3	2	3	4	2	2	0

Construct a control chart.

Q3) a) Explain in detail types of Production systems in detail. **[8]**
  b) Explain Computer Integrated Manufacturing system with respect to printing industry. **[8]**

OR

a) Explain in short Word class manufacturing & Lean Manufacturing.
b) Write a note on Mass Production & Batch Production.

SECTION - II

Q4) Explain the following Substrate Properties testing in detail. **[16]**
  a) Opacity. b) Brightness.
  c) Porosity. d) Smoothness.

OR

Explain the following Ink Properties testing in detail.
a) Viscosity.
b) Color.
c) Opacity.
d) Adhesion.

Q5) a) Explain the lithographic process control with help of Profile creation. **[10]**

b) Explain Raster image processing in detail. **[8]**

OR

a) Explain need of mointer profile with respect to obtaining Quality Printing.
b) Explain Image Editing, Trapping, Image Mixing, Preflight Check.

Q6) Explain the process of Flexography press characterization & Standardization. **[16]**

OR

Explain in short following Press Standards
GRACOL, SWOP, TAPPI and ISO.

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P1135

[4064]-525

B.E. (Printing)

COMMERCIAL GRAPHIC DESIGN

(2008 Course) (408281B) (Elective - I) (Sem. - I)

Time : 3 Hours]   *[Max. Marks : 100*

Instructions to the candidates:

    1)   *Answer any three questions from each section.*

    2)   *Answers to the two sections should be written in separate books.*

    3)   *Neat diagrams must be drawn wherever necessary.*

    4)   *Figures to the right indicate full marks.*

SECTION - I

Q1) Discuss paper sizes with margin recommendations for a graphic design. **[16]**

OR

Discuss in detail imposition layouts software: advantages/disadvantages.

Q2) Describe in detail structure of a DSLR camera and state advantages. **[18]**

OR

Write notes:

    a)   Raw file format.

    b)   CMOS sensor.

    c)   Color Temperature.

Q3) State basic elements of a graphic design. Explain in detail a press layout for a 4 page brochure of letter size, work & turn type. **[16]**

OR

List basic parameters of Bitmap and vector images to be checked for preflight.

SECTION - II

Q4) Describe in detail parameters for designing a paper board carton.   **[18]**

OR

Discuss the entire process of design for a carton and it's punching die.

Q5) Discuss file formats used for web design along with image resolutions and color modes.   **[16]**

OR

Discuss image editing tools for web designing in Adobe suite.

Q6) Describe workflow of a design - to - print job and cost elements involved.   **[16]**

OR

Describe in detail cost elements for a four page, A4 brochure including proofing.

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P1136

[4064] - 531

B.E. (Chemical)

PROCESS DYNAMICS & CONTROL

(Sem. - I) (2008 Course) (409343)

Time : 3 Hours]   *[Max. Marks : 100*

Instructions to the candidates:

1) *Answers to the two sections should be written in separate books.*

2) *Neat diagram must be drawn wherever necessary.*

3) *Figures to the right indicate full marks.*

4) *Assume suitable data, if necessary.*

SECTION - I

Q1) a)   Discuss the importance of chemical process control.   **[8]**

b)   Derive the Input-output model for stirred tank heater.   **[8]**

OR

Q2) a)   Derive the transfer function of pure capacitive process. Draw a suitable sketech.   **[8]**

b)   A thermometer showing steady state temperature of 20°C is suddenly immersed into a hot bath at 100°C. If the time constant of thermometer is 5 sec, determine the following :   **[8]**

i)   Thermometer reading after 5 sec.

ii)   Time required to read 80°C on thermometer.

iii) Time required for 80% response.

Q3) a)   Define second order system and derive the transfer function for two non interacting liquid level system in series. Comment on type of dynamic response of the system.   **[10]**

b)   A second order process with following transfer function is subjected to unit step change in input.

$$Gp = \frac{1}{s^2 + s + 1}$$

Determine the damping factor ξ and the ultimate value of response. **[6]**

P.T.O.

Q4) a) Define P, I & D controller and derive their transfer functions. Discuss their open loop response with neat diagrams. **[8]**

b) A first order process with following transfer function is controlled by PI controller. Assuming servo problem and neglecting the dynamics of final control element and measuring instrument i.e. Gf(s) = Gm(s) =

1; The open loop process is $Gp\,(s) = \dfrac{1}{s+1}$.

Determine the following : **[8]**

i) Closed loop transfer function.

ii) Order of response.

iii) Closed loop gain and time constant.

iv) Offset.

Q5) a) Define Stability of the process and discuss the Routh-Hurwitz criteria. **[6]**

b) Draw the root locus diagram for the system with following transfer function; **[12]**

$$Gp\,(s) = \frac{1}{(s+1)(s+2)(s+3)}.$$

OR

Q6) Define controller tuning and discuss the following tuning methods; **[18]**

a) Ziegler Nichols method.

b) Cohen coon method.

c) Time integral performance criteria.

SECTION - II

Q7) a) Sketch the Bode diagram for PI controller. **[9]**

b) Sketch the Nyquist diagram for PD controller. **[9]**

OR

Q8) a)   Sketch the Bode diagram for PD controller.   **[9]**

b)   Discuss the following :   **[9]**

i)   Bode stability criteria.

ii)   Nyquist stability criteria.

iii)   Gain margin & phase margin.

Q9) Draw a neat sketch and write short notes on :   **[16]**

a)   Cascade control.

b)   Feed forward control & ratio control.

OR

Q10) Draw a neat sketch and discuss in detail about;   **[16]**

a)   Adaptive control.

b)   Split range control.

Q11) Draw the instrumentation diagram for Heat exchanger control and discuss in detail about its functioning.   **[16]**

OR

Q12) Write short notes on :   **[16]**

a)   Role of digital computers in control.

b)   Supervisory control.

c)   DCS.

d)   PLC & SCADA systems.

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P1137

[4064] - 541

B.E. (Chemical)

PIPING DESIGN AND ENGINEERING

(Sem. - I) (Elective - II) (2008 Course) (409342(D))

Time : 3 Hours]　　　　　　　　　　　　　　　　　*[Max. Marks :100*

Instructions to the candidates:

　1)　Answer any three questions from each section.

　2)　Answers to the two sections should be written in separate books.

　3)　Neat diagrams must be drawn wherever necessary.

　4)　Figures to the right indicate full marks.

　5)　Use of logarithmic tables slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.

　6)　Assume suitable data, if necessary.

SECTION - I

Q1) a)　For a pipe network shown in figure. Determine the flow in each pipe. The value of n may be assumed as 2.0　　　　　　　　　**[12]**
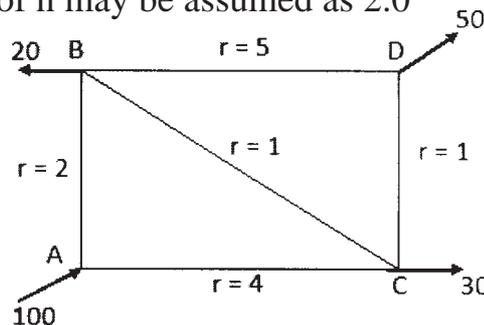
　b)　Explain the concept of restriction orifice sizing.　　　　　**[6]**

OR

Q2) a)　Discuss the procedure in determining pipe diameter for specified height of pipe wall roughness and the discharge.　　　　　**[10]**

　b)　A smooth pipe carries 6.5 liters/sec of water at 20ºC ($\nu = 10^{-6}$ m^2/sec) with a head loss of 7.5 cm per 10 meter length. Determine the diameter of the pipe.　　　　　**[8]**

Q3) a)　List out the major standards providing engineering bodies in piping. Explain most commonly used piping components and their dimensional standards.　　　　　**[10]**

　b)　Explain the different sections of ASME 31 code for pressure piping.**[6]**

P.T.O.

Q4) a) Explain the desirable properties of piping materials for low temperature and high temperature services. **[10]**

b) Discuss the functions and desirable properties of gasket materials. **[6]**

Q5) a) State and explain the factors to be considered in selecting valves. **[8]**

b) Discuss the sizing methodologies for rupture disc. **[8]**

OR

Q6) a) Explain the steps followed during sizing of control valve. **[8]**

b) How valve sizing to be done for gas and vapor with the help of basic valve flow capacity coefficient? **[8]**

SECTION - II

Q7) a) Discuss steam pipe sizing based on the flowrate and maximum velocity of the steam or pressure drop. **[10]**

b) Explain the concept of deposition velocity for heterogeneous flow of slurry in the pipeline along with different empirical correlations proposed for estimating it. **[8]**

OR

Q8) a) Explain the line sizing of pneumatic conveying system. **[10]**

b) Explain the inadequate and correct pump piping arrangement with the help of graphic information. **[8]**

Q9) a) Explain the types of plot plan and their advantages. **[8]**

b) What are the plant layout specifications considered by the design engineer? **[8]**

OR

Q10) a) Develop the typical layout considerations for distillation systems and reactors. **[8]**

b) Explain the concept of PFD, P & ID and utility diagram. **[8]**

Q11) a) What is the difference between safety and relief valve? **[8]**

b) Discuss the selection criteria for the insulation material. **[8]**

OR

Q12) Write short notes on: **[16]**
   a) Hot & cold insulation in piping.
   b) High alloy steel & its usage in piping.
   c) Critical thickness of insulation.

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P1138

[4064] - 542

B.E. (Chemical)

ADVANCED SEPARATION PROCESSES

(Sem. - I) (409342(E)) (2008 Course) (Elective - II)

Time : 3 Hours]   *[Max. Marks :100*

Instructions to the candidates:

1)   *Answers to the two Sections should be written in separate answer books.*

2)   *Neat diagrams must be drawn wherever necessary.*

3)   *Figures to the right indicate full marks.*

4)   *Use of logarthmic tables, Slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.*

5)   *Assume suitable data, if necessary.*

SECTION - I

Q1) a)   What is an adsorption isotherm. Give the five types   **[6]**

b)   Explain temperature swing regeneration giving details of stripping and heat limited process.   **[6]**

c)   What are various applications of chromatography in separation of enzymes and proteins.   **[6]**

OR

Q2) Give the types of chromatography and explain in detail Liquid chromatography separation system.   **[18]**

Q3) Explain the following term: **[16]**

a)   Fouling.

b)   Liquid emulsion membrane.

c)   Dialysis.

d)   Gas permeation.

OR

Q4) a)   Explain Osmotic Pressure.   **[4]**

b)   Explain in detail Membrane configurations.   **[8]**

c)   Give the classification of the main types of membrane separation process.   **[4]**

P.T.O.

Q5) What are the advantages of reactive distillation and where is it suitable to explore for separation purpose. Explain with suitable example. **[16]**

OR

Q6) a) Explain in detail Separation based on reversible chemical complexation. **[10]**

b) What is reactive crystallization. **[6]**

SECTION - II

Q7) a) Give the classification of flotation technique based on mechanism and size of material. **[9]**

b) Explain collapse and drianage phenomena. **[9]**

OR

Q8) a) Give applications of bubble and foam separation methods to protein and enzyme separation and waste water treatment. **[10]**

b) What is electrophoresis? Explain in detail. **[8]**

Q9) a) State the classification of adductive crystallization. **[8]**

b) What are the molecular sieves? State its applications. **[8]**

OR

*Q10)*Write detail note on: **[16]**
a) Zone Refining.
b) Clathrates and Adducts.

*Q11)*a) What is centrifugation. Give the classification of centrifuges by size of dispersed particles. **[8]**

b) Explain Ultracentrifuge in detail. **[8]**

OR

*Q12)*a) Explain in detail the Ring over technology. **[8]**

b) Explain selection of separation process with detailed case study. **[8]**

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P1139

[4064] - 555

B.E. (Petroleum)

CARBON MANAGEMENT IN PETROLEUM INDUSTRY

(Elective - II) (412385D) (2008 Course) (Sem. - I)

Time : 3 Hours]   *[Max. Marks :100*

Instructions to the candidates:

1) *Answer Q1 or Q2, Q3 or Q4, Q5 or Q6, from Section - I and Q7 or Q8, Q9 or Q10, Q11 or Q12 from Section - II.*

2) *Answers to the two Sections should be written in separate answer books.*

3) *Neat diagrams must be drawn wherever necessary.*

4) *Figures to the right indicate full marks.*

5) *Use of logarithmic tables, Slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.*

6) *Assume suitable data, if necessary.*

SECTION - I

Q1) a) What is global warming? What are the effects of it? Explain.   **[10]**

b) What is Kyoto protocol? How it is significant? Explain.   **[8]**

OR

Q2) a) What do you mean by 'carbon credit'? How carbon credit is important for various industrial sectors and the economical development of a country? Give one example.   **[12]**

b) Explain in brief, 'carbon cycle'.   **[6]**

Q3) a) List the names of various green house gases. Explain how the emission of gases from various Industrial sectors may affect the environment and life on the earth.   **[10]**

b) Describe the concept of, 'emission estimation' and its advantages.   **[6]**

OR

Q4) List the major and minor industrial sectors responsible for carbon emission. Give the details of upstream and downstream operations of oil and gas industry. Also for the Petroleum Industry, write and discuss.   **[16]**

a) sources of emission.

b) various ways of carbon management.

P.T.O.

Q5) a) Discuss in brief CO_2 storage and its applications. **[6]**

b) What is carbon sequestration? Describe in brief, geological aspect and various other approaches in carbon sequestration. **[10]**

OR

Q6) a) Discuss any one case study or research finding on carbon sequestration.**[12]**

b) Write the general advantages of carbon sequestration. **[4]**

SECTION - II

Q7) a) What are the non fossil resources of energy? **[4]**

b) Draw the schematic sketch and show various components of, any one method of renewable energy generation. Indicate various features of it.**[5]**

c) Explain in brief, the principle of operation of various methods of renewable energy generation. **[9]**

OR

Q8) What is sustainable development? Describe in detail, fundamental areas responsible for, 'sustainable development'. Also explain, how economics of a country depends on it. **[18]**

Q9) a) Write a note on sources of, bio-mass energy generation. **[6]**

b) Explain the process of , 'bio-gas generation'. **[10]**

OR

Q10) Discuss in detail various methods and sources of energy and chemicals from biomass. Write their general advantages and disadvantages. **[16]**

Q11) a) What are the methods of carbon credit generation? Discuss the scope of carbon credit generation from the point of Petroleum Industry. **[8]**

b) Describe in detail general methods of energy saving and energy management. **[8]**

OR

Q12) Write short notes on, **[16]**

a) Clean development mechanism.

b) Carbon trading.

c) Energy savings in Petroleum Industry.

d) Case study based on CDM.

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P1141

[4064]-582

B.E. (Polymer)
SURFACE COATINGS AND ADHESIVES
(2008 Course) (Elective - II) (409365 (B)) (Sem. - I)

Time : 3 Hours]   *[Max. Marks : 100*

Instructions to the candidates:

1) *Solve three questions from section-I and three questions from section-II.*
2) *Answers to section-I and section-II should be written on separate answer book.*
3) *Neat diagrams should be drawn wherever necessary.*
4) *Figures to the right indicate full marks.*
5) *Assume suitable data, if necessary.*
6) *Use of electronic pocket calculator is allowed.*

SECTION - I

Q1) a) Define surface coatings with its significance. Distinguish between paints, varnish and lacquers with suitable examples. **[5]**

b) Is paint a Newtonian or Non-Newtonian fluid? Explain the rheological behavior of paints and its significance in the paint industry. **[4]**

c) Describe wetting and dispersing agents. Explain the theory of stabilization for the same. **[5]**

d) What is Minimum Film Formation Temperature (MFFT)? How is it correlated with Tg? Explain the film formation mechanism. **[4]**

OR

Q2) a) What is the role of pigments in surface coatings? Give classification of pigments and write in brief each type of pigments. **[12]**

b) Explain the following coating additives (any two) : **[6]**

     i)   Anti-skinning Agents.
     ii)   Defoamer and Anti-foaming Agents.
     iii)   Scratch/Mar Resistance.

Q3) a) With flow diagram describe in detail the alkyd manufacturing process and plant as well as comment on the corrective measures during manufacturing operation. **[10]**

b) Write a short note on "Curing agents for epoxy resins". **[6]**

OR

Q4) a) Write classification of polyurethanes w.r.t. surface coating/paints application. Compare between moisture cured polyurethanes and two-component polyol-type polyurethanes. **[10]**

b) Calculate the quantity of ingredients required for preparation of alkyd having following specifications and ingredients : **[6]**

Specification

- Oil length = 70%
- Excess hydroxyl (glycerol) = 10% w/w
- Non-volatiles = 70%
- Yield = 10,000kg (solid alkyd resin)

Ingredients

- Safflower oil - Pure
- Phthalic anhydride - pure (Mol. Wt. 148)
- Glycerol - 95% (Mol. Wt.92)
- Lithium hydroxide - 0.04% w/w on oil basis for monoglyceride
- Mineral turpentine - to be added to 10,000kg of solid alkyd.

Q5) a) Considering each ingredient, explain in detail the paint formulation for economy. **[10]**

b) Write short note (any one) : **[6]**

i) Anti-corrosive Paints.

ii) Anti-fouling Paints.

OR

Q6) a) What are the various principles of plastic emulsion paint formulation? Based on these principles, write down the formulation and manufacturing procedure to obtain plastic emulsion paint. **[7]**

b) Comment on the following paint defects alongwith their remedies-Wrinkling, Blushing, Spitting, Orange peel effect, Chalking and Erosion, Porosity. **[9]**

SECTION - II

Q7) a) What are the Advantages of Adhesive Joint? **[6]**

b) Briefly explain "The Electrostatic Theory of Adhesion". **[7]**

c) Give classification of adhesives based on "Mode of Adhesion". Give suitable examples. **[5]**

OR

Q8) a) Epoxy adhesives do not adhere to PTFE (Teflon®) surface. True or False? Justify. **[4]**

b) Enlist various Disadvantages of Adhesive Joint. **[6]**

c) Explain in detail "Diffusion Theory of Adhesion". **[8]**

Q9) a) Give the various ingredients present in adhesive formulation. Comment of their role in adhesive formulation. **[8]**

b) What are "Pressure-sensitive" adhesives? Give suitable examples. **[4]**

c) Write a short note on "Structural Adhesives". **[4]**

OR

Q10) a) What are "Hot-melt" adhesives? Can epoxy be considered as "Hot-melt" adhesive? Justify. **[4]**

b) Compare the Water-based and Solvent-based Liquid Adhesives. **[8]**

c) Briefly comment on "Adhesives derived from Natural Products". **[4]**

Q11) a) With neat sketches explain in brief various types of stresses in adhesive joint. **[5]**

b) What is the significance of surface pretreatment in adhesive joint? Enlist various methods of surface treatments. Explain any one in detail. **[8]**

c) Explain the concept of Cohesive and Adhesive failure in adhesive joint.**[3]**

OR

Q12) a) What are the major types of joints in adhesion? Draw schematic diagrams. **[2]**

b) Enlist the various important factors to be considered before selecting adhesive. Explain any one in detail. **[7]**

c) Which test will be important for "Pressure-sensitive" adhesive? Briefly explain it. **[4]**

d) Define the following terms : **[3]**

i) Adhesive.
ii) Primer.
iii) Tackifier.

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P1142

[4064]-601

B.E. (IT)

OBJECT ORIENTED MODELING AND DESIGN

(Sem. - I) (2008 Course) (410443)

Time : 3 Hours]   *[Max. Marks : 100*

Instructions to the candidates:

1) *Answer (Q1 or Q2) and (Q3 or Q4) and (Q5 or Q6) from Section I and (Q7 or Q8) and (Q9 or Q10) and (Q11 or Q12) from Section II.*
2) *Answers to the two sections should be written in separate books.*
3) *Figures to the right indicate full marks.*
4) *In the questions based on Design you are encouraged to make further suitable assumptions depending upon scope of the system.*

SECTION - I

Q1) a) Write a short note on MDA.   **[6]**

   b) What are the salient features of RUP? How is it different from waterfall model?   **[6]**

   c) In couple of sentences each, give the need in RUP for XML,XMI.   **[6]**

                                   OR

Q2) a) Illustrate new UML 2.0 feature   **[6]**

      i)   I/p & o/p PINS
      ii) Tagged values.
      iii) Manifest.

   b) Why we need OCL? How does one model a constraint on class attributes in OCL.   **[6]**

   c) Write a short note on Common Mechanism in UML.   **[6]**

Q3) a) Explain Requirement Workflow.   **[8]**

   b) Consider College Purchase System described below. We can use the system to manage Equipment Purchasing from Suppliers. System can also manage Department Demands for new Equipment they wish the department to possess. The system can also manage Suppliers, Payments, Ordering & Cataloging of Equipments on arrival. Add further assumptions about scope of application if necessary. Draw use case diagram for this description. Using full UML notation for use case diagram.   **[8]**

OR

Q4) a) Explain the change in Activity Diagram from UML 1.4 to UML 2.0. **[8]**

b) Draw activity diagram (for software process) to depict user may do with HELP of Hypothetical Software in a PAINTBRUSH kind of picture editor system to create a sketch for a dream house from scratch right up to the final print on color plotter. Assume that the whole process is done over multiple sittings over one or more days. Make suitable assumptions about the scope of your system, software features. **[8]**

Q5) a) Draw CRC card for any two classes of an Library Management System. **[4]**

b) Show how Composite Structure can best represents CAR & its internal parts like door, transmission system, illustrate. **[6]**

c) Draw object diagram for Banking System with two classes Account & Customer and further the account may be of type saving or current. Assume suitable attributes for the classes & values for objects. **[6]**

OR

Q6) a) Explain in detail different type of advance relationships & class required for class diagram with suitable example. Make some assumptions. **[8]**

b) Compare access, import, export stereotype of package diagram. **[4]**

c) What is the purpose, need & uses of Structural Modeling. **[4]**

SECTION - II

Q7) a) Consider a Use Case "Adding an Employee to a Project". The HR Manager interacts with the Usecase to choose the employee from the list of existing employees. The employee is informed about his addition to a project and also his record is updated whenever added to a project. Make relevant and suitable assumptions where ever necessary. Draw the communication diagram by identifying the classes, actors needed and making best use of UML Notations. **[8]**

b) Draw a state machine diagram for coffee vending machine which prepare the coffee by adding material of coffee. Assume suitable data. **[6]**

c) In context of sequence diagram explain the terms : **[4]**
   i)   Lifeline.
   ii) Stereotype.

OR

Q8) a) Draw neat fragment on state machine diagram to represent the following. Explain the concept. **[6]**

    i)   Concurrent sub state & Sequential sub state.

    ii)   Composite sub state.

    b) Consider a use case in library management system namely "Issue Book from library" the member, book, issue details will have to be updated appropriately. Please identify correct objects and messages and draw sequence diagram for this scenario for use cases. **[8]**

    c) Compare Interaction Diagram and Interaction Overview Diagram. **[4]**

Q9) a) An academic institution has developed a campus wide network and has implemented Automated system. The student section, library, account section, store, office, department are all connected. All the modules are centrally served through a common server in form of web application. Identify software component required. Make assumption about their environment and depict all this in a deployment diagram. **[8]**

    b) Explain the common uses of component diagram. **[8]**

<p align="center">OR</p>

Q10) a) Consider a College Registration System, the system allows students to apply for admission. Support the shortlisting process & enrollment to courses & collecting fees to admission. From above system identify the component, the interface it supports and give a UML representation of the same with details of services the component/interface offers. Make suitable assumption about the system. **[8]**

    b) Explain purpose and application of Deployment Diagram to made Three Tier Architecture. **[8]**

Q11) a) Define Design Patterns. Draw class diagram for Observer Design Pattern. **[8]**

    b) Explain the structure of Proxy with example. **[8]**

<p align="center">OR</p>

Q12) a) Explain forward and reverse engineering of class diagram. **[8]**

    b) Explain Singelton pattern with example. **[8]**

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Total No. of Questions : 12]   **[Total No. of Pages : 3**

P1143

[4064] - 602

B.E. (Information Technology)
INFORMATION ASSURANCE AND SECURITY
(2008 Course) (Sem. - I) (414441)

Time : 3 Hours]   *[Max. Marks : 100*

Instructions to the candidates:

1) Answers 3 questions from Section - I and 3 questions from Section - II.

2) Answers to the two sections should be written in separate answer books.

3) Neat diagrams must be drawn wherever necessary.

4) Figures to the right indicate full marks.

5) Assume suitable data, if necessary.

SECTION - I

Q1) a) Categories the different attacks. Illustrate, how passive attacks leads to business loss. **[9]**

b) Illustrate how to share and split the secret and its significance in some application. **[9]**

OR

Q2) a) What is the significance of Extended Euclidian algorithm with reference to RSA Algorithm. Illustrate. **[9]**

b) Draw AES block diagram and explain the steps in general. **[9]**

Q3) a) State different modes of operation. Compare these modes. **[8]**

b) How to solve the problem of Non-repudiation. Illustrate that availability of information assets may be hampered because of reliability or security threat. **[8]**

OR

Q4) a) How is the IPSEC helpful to implement Virtual Private Network? **[8]**

b) List and state any tools used for information security. **[8]**

P.T.O.

Q5) a) State the purpose of Needham Schroeder Symmetric Protocol & public key Protocol. Moreover state the purpose of Radius Server & Kerberos Server. **[8]**

b) Illustrate the Diffiee Hellman Key Exchange Protocol **[8]**

OR

Q6) a) How IT Law 2000 describes digital signature. **[8]**

b) Encryption does not solve all the security problems: Justify. **[8]**

SECTION - II

Q7) a) List and state the channels of Key distribution in Symmetric and Asymmetric Key systems. **[8]**

b) State different Identity ways and also state the attacks on Identity. **[8]**

OR

Q8) a) Explain SSL protocol interaction sequence diagram between client and server. **[8]**

b) Explain different IDS methods with one example each. **[8]**

Q9) Write short notes on : **[18]**

a) Industrial Espionage.

b) Phishing Attack.

c) Information Security Policy.

OR

Q10) Write short notes on : **[18]**

a) Cyber Terrorism.

b) Security by obscurity.

c) IT law awareness.

*Q11)*a)   You know the 7 OSI layers. What are the layer wise security concerns?
                                                                              [8]

   b)   State the Chinese remainder theorem with example.   **[8]**

                                   OR

*Q12)*a)   Using Euclidean algorithm calculate gcd (16,20) and gcd (50,60).**[8]**

   b)   Compare Linear Cryptanalysis and Differential Cryptanalysis.   **[8]**

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P1144   **[4064]-605**

B.E. (IT)

ARTIFICIAL INTELLIGENCE

(2008 Course) (Elective - I) (Sem. - I) (414443 B)

Time : 3 Hours]   *[Max. Marks : 100*

Instructions to the candidates:

    1)   *Assume suitable data wherever necessary.*

    2)   *Separate answer books must be used for the sections.*

    3)   *Draw proper diagrams wherever necessary.*

SECTION - I

Q1) a) Define AI. Give any two applications of AI in detail.   **[8]**

    b) What is an Agent? Detail the architecture of an agent.   **[8]**

OR

Q2) a) Write a detailed note on Swarm Intelligence.   **[8]**

    b) What are the criteria for the technique to be qualified as AI technique? Justify.   **[8]**

Q3) a) Explain Constraint Satisfaction with proper example.   **[8]**

    b) What is Hill Climbing? Explain in detail with the problems of Local Maxima, Plateu and Ridge.   **[10]**

OR

Q4) a) Write Minimax Search Algorithm for two players. How can we add alpha and beta cut-offs for better performance.   **[10]**

    b) List and explain all Production system characteristics for AI system.   **[8]**

Q5) a) Explain Conceptual Dependency in detail.   **[8]**

    b) Give in detail the significance of Discourse Integration and Pragmatic Analysis in NLP.   **[8]**

OR

Q6) a) Explain ATN with example.   **[10]**

    b) Write the notes on JTMS and ATMS.   **[6]**

SECTION - II

Q7) a) Consider the following representation from blocks world, **[12]**

Start : ON (B,D) ∧ ON(C,B) ∧ ONTABLE(D) ∧ ONTABLE(A)

Goal : ON(A,B) ∧ ON(C,D) ∧ ONTABLE(B) ∧ ONTABLE(D)

    i) Show how strips would solve this problem.

    ii) Did these processes produce optimum plans. If not justify how can it be done.

  b) What are the various components of a typical planning system? **[6]**

<div align="center">OR</div>

Q8) a) Explain Non-Linear planning with example. **[8]**

  b) Write notes on Learning methods and TWEAK algorithm. **[10]**

Q9) a) Explain typical architecture of an Expert System. **[8]**

  b) Give two typical applications of Artificial Neural Networks. **[8]**

<div align="center">OR</div>

Q10) a) What is 'learning by Parameter' adjustment? Explain with example. **[6]**

   b) Explain Back Propagation Neural Network in detail. **[10]**

Q11) a) Write a note on Parallel and Distributed AI. **[8]**

   b) Why does PROLOG qualify to be an AI language? Discuss. **[8]**

<div align="center">OR</div>

Q12) a) Explain the working principle of Genetic Algorithm. **[10]**

   b) Write a Prolog program to print numbers 1 to 10 using recursion. **[6]**

<div align="center">❀ ❀ ❀</div>

P1145

[4064]-608

B.E. (IT)

EMBEDDED SYSTEM

(2008 Course) (414444 (A)) (Elective - II) (Sem. - I)

Time : 3 Hours]   *[Max. Marks : 100*

Instructions to the candidates:

  1) *Answer Q. 1 or Q. 2, Q. 3 or Q. 4, Q. 5 or Q. 6, Q. 7 or Q. 8, Q. 9 or Q. 10, Q. 11 or Q. 12.*
  2) *Answers to the two sections should be written in separate answer books.*
  3) *Neat diagrams must be drawn wherever necessary.*
  4) *Figures to the right indicate full marks.*
  5) *Assume suitable data, if necessary.*

SECTION - I

Q1) a) What is design metric? Explain all the design metrics of an Embedded system. **[8]**

  b) Define Embedded System and give its classification covering all types of embedded systems. **[6]**

  c) Discuss the significant characteristics of Embedded Systems. **[4]**

OR

Q2) a) Explain generalized block diagram of embedded system and elaborate on processor block in depth covering all possible options of implementation of processor block. **[8]**

  b) The design of a particular product has NRE cost of Rs.1,00,000/-. How much will we have to add to the cost of each product if we sell : **[10]**

  i) 100 units
  ii) 200 units.

  Cost of a unit product is Rs.20/-.

Q3) a) With an example explain the factors to be considered while selecting a processor for an embedded system. **[8]**

  b) Explain usage of timers, counters and watchdog timer with reference to embedded system. **[4]**

  c) What is real time clock? Explain its use with reference to Embedded System. **[4]**

P.T.O.

Q4) a) Explain the different types of RAM and ROM used in embedded systems. **[8]**

b) What is PWM (Pulse Width Modulation)? How this feature is useful in development of any embedded application. **[4]**

c) What is the impact of clock on working of Embedded System? How clocking unit is designed for Embedded System? **[4]**

Q5) a) Draw and explain interfacing of ADC/DAC to any processor and state the necessity of this interfacing. **[8]**

b) Explain 12C protocol in details. **[8]**

OR

Q6) a) Draw and explain interfacing of LCD to any processor. Also state the methods of interfacing depending upon the no. of lines used for interfacing. **[8]**

b) Explain USB protocol in details. **[8]**

SECTION - II

Q7) a) List popular data structures used in development of embedded system with detailed explanation of any three data structures. **[8]**

b) List and explain various software tools required in development of an embedded system. **[8]**

OR

Q8) a) Differentiate between compilers and cross compilers. Discuss the factors for language selection for S/W development of embedded system. **[8]**

b) Explain how software engineering practices are used in embedded software development process. **[8]**

Q9) a) Differentiate between conventional OS and Embedded OS. **[8]**

b) List various categories of Embedded OS with example. **[4]**

c) Discuss interrupt latency and response time with respect to execution of interrupt in RTOS environment. **[4]**

OR

Q10) a) List various kernel objects and explain any two kernel objects used for synchronization between tasks, task and interrupt. **[8]**

b) Explain the problem of priority inversion and discuss the solutions for the same. **[8]**

Q11) a) Discuss the case study of Vending machine. **[9]**

b) Discuss the case study of smart card. **[9]**

OR

Q12) a) Discuss the case study of cruise control system for car. **[9]**

b) Discuss the case study of Digital Camera. **[9]**

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P1146   **[4064]-610**

B.E. (Information Technology)
MULTIMEDIA SYSTEMS
(2008 Course) (Elective - II) (414444 (C)) (Sem. - I)

Time : 3 Hours]   *[Max. Marks : 100*

Instructions to the candidates:

1) *Answer Q. 1 or Q. 2, Q. 3 or Q. 4, Q. 5 or Q. 6 from section-I & Q. 7 or Q. 8, Q. 9 or Q. 10, Q. 11 or Q. 12 from section-II.*
2) *Answers to the two sections should be written in separate answer sheets.*
3) *Neat diagrams should be drawn wherever necessary.*
4) *Figures to the right indicate full marks.*
5) *Use of electronic pocket calculator is allowed.*
6) *Assume suitable data if necessary.*

SECTION - I

Q1) a) What is multimedia document architecture? Explain what do you mean by MHEG and SGML? **[9]**

b) What is streaming technology? Explain in detail advantages of streaming media over conventional media. **[9]**

OR

Q2) a) Explain goals and objectives of the multimedia system. Also explain any five applications of multimedia? **[9]**

b) What is multimedia authoring? State and explain various types of multimedia authoring tools. **[9]**

Q3) a) Explain different image enhancement techniques by point processing. **[8]**

b) Write short note on : JPEG compression technique. **[8]**

OR

Q4) a) Explain different spatial filtering techniques. **[8]**

b) Write short note on : Vector Quantization. **[8]**

Q5) a) What are different audio devices used in multimedia systems? Explain any four. **[8]**

b) Explain audio file formats .Wav and .Voc **[8]**

OR

Q6) a) Describe a CD-ROM in terms of [8]

      i) The layers in it.
      ii) Layout of tracks.
      iii) Lands and pits on it.

    b) Compare : [8]

      i) DM and ADPCM.
      ii) Digital audio and MIDI.

SECTION - II

Q7) a) Explain various features of H.261 and H.263. [8]

    b) Explain any four video transmission standards. [8]

OR

Q8) a) Write short note on : [8]

      i) Video editing.
      ii) DVD format.

    b) What is video recording system? Explain DVCAM in detail. [8]

Q9) a) What is VRML? Explain the applications of VRML with the help of suitable example. [8]

    b) Explain the different forms of virtual reality. [8]

OR

Q10) a) What do you mean by VR devices? Explain head mounted displays with its features. [8]

    b) Write VRML code to create a virtual coffee house using VRML. [8]

Q11) a) What is animation? Explain with respect to animation : [9]

      i) Kinematics.
      ii) Morphing.
      iii) Onion Skinning.

    b) Explain suitable example. Creation of animation using flash player. [9]

OR

Q12) Write short notes on : [18]

    a) 3-D animation.
    b) Animation on web.
    c) Flip Book Animation.

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P1147

[4064]-611

B.E. (Biotechnology)

BIOSEPARATION - II

(415463) (2008 Course) (Sem. - I)

Time : 3 Hours]   *[Max. Marks : 100*

Instructions to the candidates:
1)   Answers three questions from Section - I and three questions from Section - II.
2)   Answers to the two sections should be written in separate answer books.
3)   Neat diagrams must be drawn wherever necessary.
4)   Figures to the right indicate full marks.
5)   Assume suitable data, if necessary.

SECTION - I

Q1) a)   Explain role and importance of downstream processing in biotechnological processes.   **[6]**

b)   Explain following classes of producs with process design criteria.**[12]**
    i)   High volume low value product.
    ii) Low volume high value product.

OR

Q2) a)   What are the general problems of bio product purification? Enlist them with example.   **[8]**

b)   How bioprocesses can be characterized? Differentiate between modern versus classical biotechnology.   **[10]**

Q3) Write Beer-Lambert's Law and explain instrumentation of spectrophotometry with their types.   **[16]**

OR

Q4) Describe in detail :   **[16]**
    a)   Spectroflurometry.
    b)   NMR.

Q5) a) Define Ion exchange chromatography. What is the principle behind it? List out the applications of ion exchange chromatography. **[8]**

b) Explain chromatofocussing in detail. **[8]**

OR

Q6) What is HIC (Hydrophobic interaction chromatography) explain it in detail. **[16]**

SECTION - II

Q7) Explain instrumentation of HPLC with following parts : **[18]**

a) Pumps.   b) Degasser.

c) Mixer.   d) Guard column.

e) Column.   f) Detector.

OR

Q8) Explain in detail gas chromatography with a neat sketch. Describe the concept of chromatogram and terminologies used to explain it. **[18]**

Q9) Write short notes on (Any 2, 8 marks each) : **[16]**

a) Molecular sieves.

b) SFE.

c) Aqueous two phase system.

d) Precipitation.

Q10) How downstream processing techniques are applied to following bio-products? Explain two of them with case studies. (8 marks each) **[16]**

a) Peptide Antibiotics.

b) Beer.

c) Butanol.

d) Microbial Polysaccharides.

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P1148

[4064]-612

B.E. (Biotechnology)

INSTRUMENTATION AND PROCESS CONTROL

(2008 Course) (415464) (Sem. - I)

Time : 3 Hours]   *[Max. Marks : 100*

Instructions to the candidates:

    1)   Answer three questions from Section I and three questions from Section II.

    2)   Answers to the two sections should be written in separate answer books.

    3)   Neat diagrams should be drawn whenever necessary.

    4)   Figures to the right indicate full marks.

    5)   Use of electronic pocket calculator is allowed.

    6)   Assume suitable data, if necessary.

SECTION - I

Q1) a) Describe in brief the principle, construction & working of an electromagnetic flow meter. **[8]**

    b) Explain in brief the working principle of the following instruments : **[8]**

       i)   Thermocouple.

       ii) Hot wire anemometer.

OR

Q2) a) With the help of neat sketch, explain the principle and working of a Radiation pyrometer. **[8]**

    b) Write short notes on : **[8]**

       i)   McLeod pressure gauge.

       ii) Thermal conductivity measurement of gases.

Q3) a) Derive the transfer function for a liquid level system with constant flow output. Also derive its response for a unit step input and state the characteristics of the output. **[8]**

    b) A thermometer follows first order dynamics with time constant of 0.2 min. It is placed in a temperature bath at 100ºC and is allowed to reach steady state. It is suddenly transferred to another bath at 150ºC at time $t = 0$ and is left there for 0.2 min. It is then returned to original bath at 100ºC. Calculate reading of the thermometer at $t = 0.1$ min and $t = 0.4$ min. Also sketch the input and response curves. **[8]**

OR

Q4) a) Consider a CSTR in which a reaction is occurring $A \longrightarrow B$ and it proceeds at a rate $r = kC_0$

Derive the transfer function for this system. **[6]**

b) A liquid level system has a cross sectional area of 3 ft². The valve characteristics are $q = 8\sqrt{h}$.

Calculate the time constant for this system when the average operating level is 3 feet and 9 feet. **[5]**

c) With the help of a neat sketch explain the characteristics of response of a first order system to a sine input. **[5]**

Q5) a) What are the characteristics of a second order system? Derive the transfer function for a U-tube manometer system and state the significance of the constants appearing in the transfer function. **[8]**

b) With the help of a neat sketch, explain the following terms with respect to a second order system. **[5]**

   i) Overshoot.
   ii) Decay ratio.
   iii) Rise time.
   iv) Period of oscillation.

c) What is transportation lag? Derive the transfer function for transportation lag. **[5]**

OR

Q6) a) Derive the transfer function $H_2(s)/Q(s)$ for a liquid level system shown in figure. The resistances are linear and $R_1 = R_2 = 1$. **[8]**
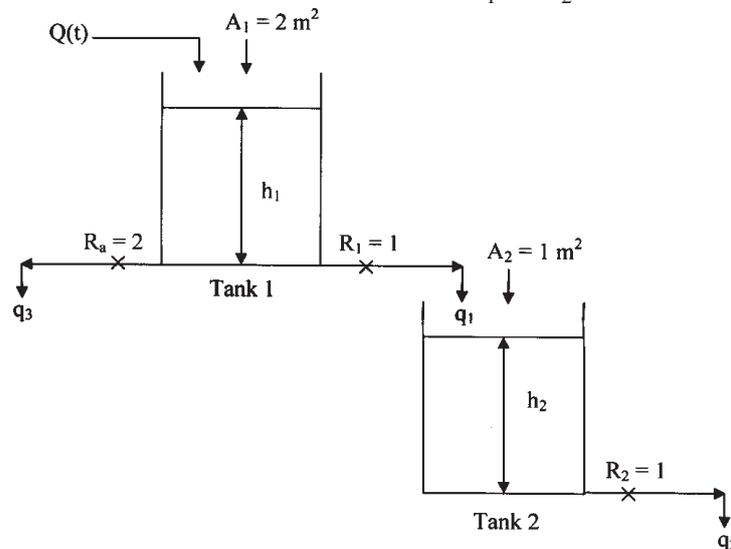
b) Derive the response of a second order system for an impulse input. Explain the nature of outputs based on the valves of the damping coefficient. **[5]**

c) How does the step response of interacting and non-interacting tank systems vary from that of a single tank system? Why? **[5]**

SECTION - II

Q7) a) What is proportional derivative control? Derive its transfer function and state the characteristics of the response generated by a PD controller.**[6]**

b) A pneumatic proportional controller is used to control temperature within the range of 60°F to 100°F. The controller is adjusted so that the output pressure goes from 3 psi (valve fully open) to 15 psi (valve fully closed) as the measured temperature goes from 71°F to 75°F with the set point held constant. Find the gain and the proportional bond. **[4]**

c) For the control system shown in the figure, determine the transfer function $C(s)/R(s)$. **[6]**

OR
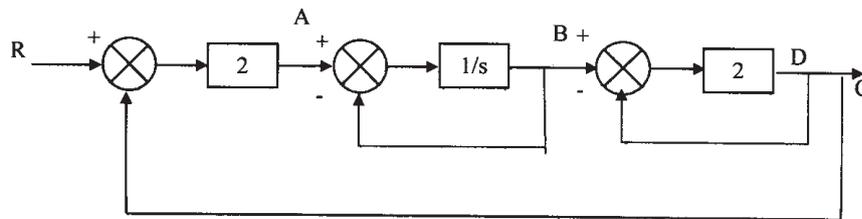
Q8) a) Differentiate between : **[4]**
   i)   Negative & positive feedback.
   ii) Servo & regulator problem.

b) With the help of a neat sketch, explain the control actions of different types of controllers. **[4]**

c) Determine the overall transfer function $C(s)/R(s)$ for the following control system : **[8]**
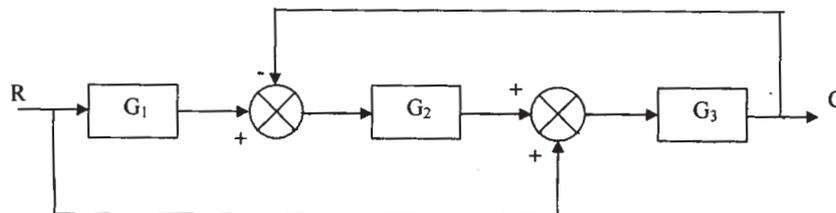
Q9) a) Using $\tau_1 = 1$, $\tau_2 = 2$ and $\tau_3 = 3$, determine the value of K_c for which the following control system is stable. For which value of K_c the system is on the verge of instability and also determine the roots of the characteristic equation. **[9]**
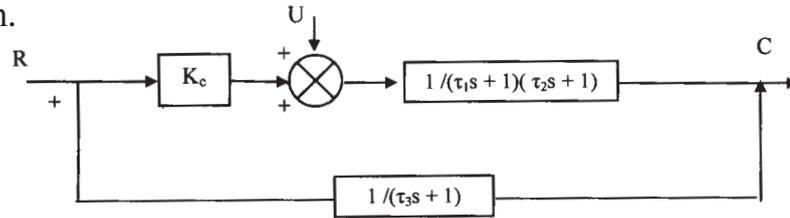
b) Draw the root locus diagram for the system shown in the figure below: **[9]**
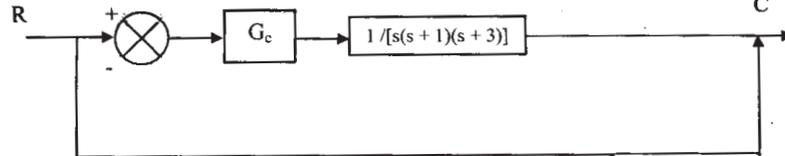
where $G_c = K_c(1 + 2s)$

OR

Q10) a) The open loop transfer function of a control system is given as : **[6]**

$$G(s) = \frac{K_c(s+2)}{s(s+3)(s+4)}$$

Determine the stability of the system using Routh's criteria.

b) Draw the Bode plot for the following system : **[6]**

$$G(s) = \frac{1}{(0.1s+1)(10s+1)}$$

c) Write in brief about Ziegler Nichols tuning rules. **[6]**

Q11) a) Explain in detail what Cascade control is. Support your answer with examples. **[8]**

b) In a fermenter, how is the control obtained for the following parameters? **[8]**
   i) Foam.
   ii) pH.

OR

Q12) Write short notes on the following : **[16]**
   a) Artificial Neural Networks
   b) Ratio control system.
   c) Override control system.
   d) Speed control in fermenter.

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P1150   **[4064]-614**

B.E. (Biotechnology)

ENVIRONMENTAL BIOTECHNOLOGY

(2008 Pattern) (415461) (Elective - I) (Sem. - I)

Time : 3 Hours]   *[Max. Marks : 100*

Instructions to the candidates:
  1) *Answer Q.No. 1 or Q.No. 2, Answer Q.No. 3 or Q.No. 4, Answer Q.No. 5 or Q.No. 6, Answer Q.No. 7 or Q.No. 8, Answer Q.No. 9 or Q.No. 10, Answer Q.No. 11 or Q.No. 12,*
  2) *Answers to the two sections should be written in separate answer books.*
  3) *Neat diagrams must be drawn wherever necessary.*

SECTION - I

Q1) A completely mixed activated sludge process is to be used to treat wastewater flow of 500m^3/hr. having a soluble BOD$_5$ of 250mg/L. The concentration of soluble BOD$_5$ escaping treatment is 10mg/L. Design criteria are as follows:

Y = 0.5, k = 5 day^{-1}, K$_d$ = 0.06 day^{-1}, K$_s$ = 100mg/L and the concentration of MLVSS (X) = 2000mg/L.

Calculate the following: **[18]**

  a)   The treatment efficiency.

  b)   The mean cell residence time, θ_c.

  c)   The hydraulic retention time, θ.

  d)   The volume of the aeration tank.

OR

Q2) Describe in detail about: **[18]**

  a)   Chemical Oxygen Demand.

  b)   Biochemical Oxygen Demand.

Q3) Answer the following: **[16]**

   a)   Explain in detail about fluidized bed reactor employed for the treatment of waste water. Discuss its advantages and disadvantages.

   b)   Define the term trickling filter and discuss the trickling filter equipment. Explain about the classification of filters.

<p style="text-align:center">OR</p>

Q4) Answer the following: **[16]**

   a)   A trickling filter 80-ft in diameter is operated with a primary effluent of 0.380 MGD and a recirculated effluent flow rate of 0.560 MGD. Calculate the hydraulic loading rate on the filter in units gallons per day per square foot.

   b)   Write in detail about oxidation ditches used for waste water treatment.

Q5) Discuss the various common parameters which are been used to analyze the industrial waste waters. **[16]**

<p style="text-align:center">OR</p>

Q6) Answer in detail: **[16]**

   a)   Disposable standards for paper and pulp industrial waste water.

   b)   Treatment strategies for textile industry waste water.

<h2 style="text-align:center"><u>SECTION - II</u></h2>

Q7) Define air pollution and explain the classification and properties of air pollutants. Describe the effect of air pollutants on human health. **[18]**

<p style="text-align:center">OR</p>

Q8) Write short notes on: **[18]**

   a)   Basic design and operating principle of cyclone separator.

   b)   Sampling and analysis of air pollutants.

Q9) Describe in detail sources and classification of solid waste. Explain the disposal methods like open dumping, sanitary landfill and incineration. **[16]**

OR

Q10) Write short notes on: **[16]**

    a) Physical treatment for hazardous waste.

    b) Hazardous waste classification.

    c) Biological treatment for hazardous waste.

    d) Different strategies for waste minimization.

Q11) Write short notes on: **[16]**

    a) Biostimulation and bioaugmentation.

    b) Bioventing and Biosparging.

OR

Q12) Answer the following: **[16]**

    a) What is phytoremediation? Describe its advantages and limitations.

    b) What is Wormicomposting? How it can be used for waste management?

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P1151   **[4064]-616**

B.E. (Biotechnology)

Bio-Therapeutics Technology

(2008 Pattern) (415461) (Sem. - I) (Elective - I)

Time : 3 Hours]   *[Max. Marks : 100*

Instructions to the candidates:
    1)   *Answer Q.No. 1 or Q.No. 2, Answer Q.No. 3 or Q.No. 4, Answer Q.No. 5 or Q.No. 6, Answer Q.No. 7 or Q.No. 8, Answer Q.No. 9 or Q.No. 10, Answer Q.No. 11 or Q.No. 12,*
    2)   *Answers to the two sections should be written in separate answer books.*
    3)   *Neat diagrams must be drawn wherever necessary.*

SECTION - I

Q1) With the help of a schematic representation, explain the typical production process of a biotherapeutic agent.   **[18]**

<div align="center">OR</div>

Q2) Discuss the advantages of biotherapeutic agents over conventional medicines. Add a note on different types of biotherapeutic medicines developed so far.

                                                     [18]

Q3) Discuss in detail various aspects of "Clinical Trial Design". Add a note on types of clinical trials.   **[16]**

<div align="center">OR</div>

Q4) Answer the following: **[16]**

    a)   Enlist different recombinant protein expression systems. Discuss any one of them in detail.

    b)   What are pre-clinical trials? How are they useful in development of a biotherapeutic agent?

Q5) Write notes on the following: **[16]**

   a) Differentiate between Biological medicine and biotherapeutic medicines. Give atleast two examples of each type.

   b) "Hybridoma technology can be used for manufacture of a Biotherapeutic agent": Justify.

<div align="center">OR</div>

Q6) Write short notes on Any Four: **[16]**

   a) Bioequivalence.

   b) Disease transmission through biotherapeutic agents.

   c) Fusion vectors.

   d) Acute and chronic toxicity.

   e) Advantages of bacterial expression system.

<div align="center">

SECTION - II

</div>

Q7) Describe the concept of Cell banking with the help of a schematic representation. **[18]**

<div align="center">OR</div>

Q8) What are clean rooms? With the help of a neat labeled diagram explain the significance of a clean room. **[18]**

Q9) Explain the role of Quality Assurance process in manufacture of medicines. **[16]**

<div align="center">OR</div>

Q10) Answer the following: **[16]**

   a) Define "Formulations". Enlist different types of formulations with their principles and one example each.

   b) What is accelerated and real time stability of a drug. How is it determined?

Q11) Discuss the following: **[16]**

    a) Route of drug administration varies with chemical nature and role of the drug.

    b) Drug delivery systems with atleast two examples.

<div align="center">OR</div>

Q12) Write short notes on (Any Four): **[16]**

    a)   cGMP.

    b)   US-FDA.

    c)   DCGI.

    d)   Stem cells as Biotherapeutic agents.

    e)   Monoclonal antibodies in diagnostics.

    f)   Pyrogen testing.

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P1152

[4064]-617

B.E. (Biotechnology)

BIOENERGY AND RENEWABLE RESOURCES

(2008 Course) (415462) (Elective - II) (Sem. - I)

Time : 3 Hours]   *[Max. Marks : 100*

Instructions to the candidates:

1) *Figures to the right indicate full marks.*
2) *Draw a neat labeled sketch wherever necessary.*
3) *Answer any three questions from section-I and any three questions from section-II.*

SECTION - I

Q1) Write down the principle, advantages and disadvantages of the following :
[18]

a) Fuel cells.
b) Geothermal energy.
c) Tidal energy.
d) Photovoltaic.

OR

Q2) a) What are the prospects of non-conventional energy sources in India? Explain. **[9]**

b) What is the environmental impact of conventional energy sources? Give advantages of non-conventional energy sources. **[9]**

Q3) a) What are the advantages and disadvantages of wind energy conversion system? **[8]**

b) What is the basic principle of wind energy conversion? **[8]**

OR

Q4) a) What are the various methods of tidal power generation? Explain each briefly. **[8]**

b) Explain in detail the flatbed steam system for geothermal energy. **[8]**

Q5) a) Write principle and working of solar photovoltaic power generation. **[8]**

b) Explain methods to produce hydrogen from solar energy. **[8]**

OR

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Q6) Explain in detail :

   a) The need of solar energy in the world and in India. **[8]**

   b) Domestic and industrial application of solar energy. **[8]**

SECTION - II

Q7) a) Describe the methods used to treat free fatty acids in vegetable oil during biodiesel production. **[9]**

   b) What are the steps involved in biodiesel production at industrial level? Explain with a neat flowchart. **[9]**

OR

Q8) a) Explain transesterification process and problems faced while implementing at industrial level. **[9]**

   b) What is a photobioreactor? Explain types and advantages of each. **[9]**

Q9) a) What is the role of detoxification? Explain one method each for physical, chemical and biological detoxification. **[10]**

   b) Explain concept of biorefinery and its economics. **[6]**

OR

Q10) a) What are the challenges in butanol fermentation? Explain any two approaches to overcome them. **[10]**

   b) Why pretreatment is required for lignocellulosic material? Explain in detail any two methods of pretreatment. **[6]**

Q11) a) How are the biogas plants classified, explain each briefly with a diagram. **[8]**

   b) Enlist and briefly describe main design considerations for optimum size biogas plant. **[8]**

OR

Q12) a) Explain in detail the various biochemical processes involved in the production of biogas along with the microbes involved in each step. **[8]**

   b) Define anaerobic biodigestion. Enlist the factors affecting biogas production. **[8]**

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P1172

[4064]-164

B.E. (Printing)

ELECTRONIC IMAGE SETTING

(2003 Course) (Sem. - I) (408285)

Time : 3 Hours]   *[Max. Marks : 100*

Instructions to the candidates:

    1)   *All questions are compulsory.*

    2)   *Answers to the two sections should be written in separate books.*

    3)   *Neat diagrams must be drawn wherever necessary.*

    4)   *Figures to the right indicate full marks.*

SECTION - I

Q1) Explain working of RIP software in details.   **[18]**

OR

Explain working of hardware RIP and its evolution to software in details.

Q2) Explain working of internal drum imagesetter with neat diagram.   **[16]**

OR

Explain working of capstan imagesetter with neat diagram.

Q3) What are different types of CRT displays? Explain any 3 with neat diagram.

[16]

OR

What is display processor? Explain in details.

SECTION - II

Q4) What is postscript file? State its usages in printing industry. **[16]**

OR

Compare and contrast between open file format and PS file.

Q5) What are the types of PDF files? Explain any 3 types with its application in details. **[18]**

OR

Which file formats are commonly used for saving illustrations and drawings? Why?

Q6) What are different types of CTP technology? Explain with neat diagram. **[16]**

OR

What is PDF workflow? Explain its significance in printing industry.

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P1173

[4064]-162

B.E. (Printing)
SURFACE PREPARATION - II
(2003 Course) (Sem. - I) (408283)

Time : 3 Hours]   *[Max. Marks : 100*

Instructions to the candidates:

    1)   *Answers to two sections should be written separately.*
    2)   *Draw neat diagram wherever necessary.*

<u>SECTION - I</u>

Q1) a) Describe the process of making a Rubber plate.   **[10]**

     b) Explain the benefits of Photopolymer.   **[8]**

                                 OR

     a) Explain in detail Layout requirements for Flexography.   **[12]**

     b) State the applications of Flexography.   **[6]**

Q2) a) Write notes on :   **[6]**
        i)   Presence of fog in a negative.
        ii)   Effect of Main exposure.

     b) Calculate distortion factor and new negative length for 2.84 mm plate thickness having printed length of 50 cm.   **[10]**

                                   OR

     a) Mention the specifications of negative for Flexo Plate.   **[8]**

     b) Mention the safety precaution for Exposure Unit.   **[8]**

Q3) Explain in detail processing of Photopolymer Flexo Plate.   **[16]**
                                   OR

     a) Explain Video mounting technique for Flexo Plate.   **[10]**

     b) Write notes on :   **[6]**
        i)   Mounting Tape for Flexo Plate.
        ii)   Photopolymer plate Orientation.

SECTION - II

Q4) a) Describe the stages of preparation of Digital Flexo Plate. **[10]**

b) Write notes on : **[8]**
   i)   Components and Properties of PerC/Bu
   ii)   Inspection the Wash-out Solvent.

OR

Explain in detail stages involved in standardization of a Flexo Plate. **[18]**

Q5) a) Explain in detail Etching process for Gravure. **[10]**

b) Write notes on : **[6]**
   i)   Features and Applications of Gravure Process.
   ii)   Functions of copper and nickel.

OR

a) Explain the electro-mechanical engraving of a Gravure cylinder. **[10]**

b) Write notes on : **[6]**
   i)   Cell Geometry for Gravure.
   ii)   Gravure Proofer.

Q6) a) Explain in detail Gravure workflow. **[10]**

b) Write notes on : **[6]**
   i)   Purpose of Chrome in Gravure cylinder making.
   ii)   CSR Technique.

OR

Write notes on : **[16]**

a) Leveling Effect and Epitaxy.

b) Circulation of Electrolyte.

c) Immersion Factor.

d) Covering Power.

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P1180

[4064]-492

B.E. (E & TC)
VLSI DESIGN AND TECHNOLOGY
(2008 Course) (404182) (Sem. - I)

Time : 3 Hours]   *[Max. Marks : 100*

Instructions to the candidates:

1) *Answer any three questions from each section.*
2) *Answers to the two sections should be written in separate books.*
3) *Neat diagrams must be drawn wherever necessary.*
4) *Figures to the right indicate full marks.*
5) *Use of logarithmic tables, slide rules, Mollier charts, electronic pocket calculator and steam tables is allowed.*
6) *Assume suitable data, if necessary.*

SECTION - I

Q1) a) Explain the different wire and device parasitics. How do these put limitations on the design with CMOS? **[8]**

   b) Explore current sink and source. What are voltage compliances? How to improve them? **[8]**

OR

Q2) a) Differentiate, three types of CMOS Inverters wrto gain, bandwidth and Rout. **[8]**

   b) Draw the equivalent circuit of MOSFET as a non ideal switch. Explain all components. **[8]**

Q3) a) Draw 8:1 Multiplexer using Transmission Gates. Compare this schematic with conventional design. **[8]**

   b) What is Static, Dynamic and Short Circuit Power Dissipation in CMOS? Derive the expression for Dynamic Power Dissipation. **[8]**

OR

Q4) a) Explain Hot Electron effect and Body effect in CMOS devices. **[8]**

   b) What is Technology Scaling? Explain three ways of scaling the devices.**[8]**

Q5) a) Write a VHDL code for 4 bit Full Adder, using 1 bit Full Adders. Use structural style of modeling. Also, draw neat circuit diagram with notations.**[9]**

   b) Compare Function and Procedure. Write a VHDL function which adds two, 8 bit vectors and returns a 9 bit sum. **[9]**

OR

Q6) a) Write a VHDL code for 1101 Moore sequence Detector. **[9]**

b) Explain Resolution Function and operator overloading in VHDL. **[9]**

SECTION - II

Q7) a) Explain any four important specifications of FPGA. Also explain CLB's in FPGA. **[8]**

b) What is the difference between logic implemented in CPLD and logic implemented in FPGA? **[8]**

OR

Q8) a) Explain with diagram SRAM and Antifuse FPGA. What factors are considered to make a choice in between SRAM and Antifuse FPGA?**[8]**

b) Draw the block diagram and explain the architecture of CPLD. **[8]**

Q9) a) Explain the concept of controllability and observability with the help of an example. **[8]**

b) Explain : **[8]**
   i)   Partial scan and full scan.
   ii) Stuck at 'l' and 'o' faults.

OR

Q10) a) What is the need of Design for Testability? Explain the different electrical faults. **[8]**

b) What is Built in self Test? Explain self Test Circuit for RAM. **[8]**

Q11) a) How to achieve EMI immune chip design? Explain the parasitics involved in routing matrix. **[9]**

b) Explain the following : **[9]**
   i)   Supply and Ground bounce.
   ii) Clock Skew.
   iii) Clock Jitter.

OR

Q12) a) What is Signal Integrity? Explain the important issues in SOC. design.**[9]**

b) Explain Input pad design, output pad design and 3- state pad design in a chip. **[9]**

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P1196

[4064] - 9

B.E. (Civil)

ARCHITECTURE & TOWN PLANNING

(Sem. - I) (Elective - I) (2003 Pattern) (401005)

Time : 3 Hours]   *[Max. Marks :100*

Instructions to the candidates:

1) *Answer Q1 or Q2, Q3 or Q4, Q5 or Q6, from Section - I and Q7 or Q8, Q9 or Q10. Q11 or Q12 from Section II.*

2) *Figures to the right indicate full marks.*

3) *Answers to the two Sections should be written in separate books.*

4) *Assume suitable data, if necessary.*

SECTION - I

Q1) a) Explain how architectural planning principles are use full in designing any structure.   **[9]**

     b) What are factors in architecture?   **[8]**

                                OR

Q2) a) State the details of gothic & Renaissance architecture.   **[9]**

     b) Giving suitable examples explain 'A structure depicts qualities of architecture'.   **[8]**

Q3) a) Explain the importance of Neighbourhood concept in urban design. **[9]**

     b) Write a short notes on any two.   **[8]**

        i)   Work of Ebenza Haward.

        ii)   Garden city giving examples.

        iii) T.P.Schemes.

                                OR

Q4) a) What planning aspect are deal with Neighbourhood?   **[9]**

     b) Establish the relation within connectivity matrix and planning.   **[8]**

Q5) a) How infrastructure is supported through UDPFI?   **[8]**

     b) Describe the aims, objective and contents of MRTP Act.   **[8]**

                                OR

Q6) a) Explain in detail ULC Act.   **[8]**

b) Define D.P and mention the surveys & aspect of D.P.   **[8]**

SECTION - II

Q7) a) Describe in details the different landscaping elements.   **[9]**

b) What is the concept of soft & hard landscape?   **[8]**

OR

Q8) a) What is landscape design? Explain with sketches the various aspects of landscape planning.   **[9]**

b) Write short note on : Soft landscape, Elements of landscape.   **[8]**

Q9) a) Explain in details how will you carry out a traffic & transportation survey for D.P.   **[8]**

b) Which factors will you consider for the drainage system of a new town? Explain.   **[9]**

OR

*Q10)*a) Write a note on Demographic survey.   **[8]**

b) Which factors will you consider for the water supply scheme of a new town? Explain.   **[9]**

*Q11)*a) Describe the roll of GIS, GPS & remote sensing in town planning.   **[8]**

b) What are the applications of Geomatics in traffic & transportation.   **[8]**

OR

*Q12)*Write short note on: **[16]**
a) Use of GPS in transportation.
b) GPS segments.
c) Remote sensing.
d) Applications of GIS in town planning.

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[4064] - 184

P1197

B.E. **(Chemical Engineering)**

PROCESS EQUIPMENT DESIGN - II

(409345) (2003 Course) (Sem. - I)

Time : 3 Hours]   *[Max. Marks :100*

Instructions to the candidates:

1)   *Answer any 3 questions from each section.*

2)   *Answers to the two Sections should be written in separate answer books.*

3)   *Neat diagrams must be drawn wherever necessary.*

4)   *Figures to the right indicate full marks.*

5)   *Use of logarithmic tables slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.*

6)   *Assume suitable data, if necessary.*

SECTION - I

Q1) a)   Explain anchor type & propeller type of agitators, their functioning & applications.   **[6]**

b)   A jacketed agitated reactor consists of a vertical cylinder 1.2 m in diameter with a hemispherical base & flanged flat top. Jacket is fitted to the cylindrical section only and extends to a height of 0.9 m. spacing between the jacket & vessel wall is 75 mm. The jacket is fitted with a spiral baffle. The pitch between the spirals is 200 mm. The jacket is used to cool the reactor contents with chilled water at 10ºC @ 32,500 kg/h. Exit temperature of water is 20ºC Estimate the heat transfer coefficient at the outside wall of the reactor and pressure drop in the jacket [$j_f = 3.2 \times 10^{-3}$]   **[10]**

OR

Q2) a)   What parameters should be considered for agitator selection.   **[6]**

b)   Design a jacketed vessel with the following specifications;   **[10]**

Vessel internal diameter   = 2120 mm

Jacket internal diameter   = 2320 mm

Jacket length   = 2500 mm

Flanged and dished head:

Internal diameter   = 2120 mm

Crown radius	= 2120 mm
Knuckle radius	= 120 mm
Straight flange length	= 50 mm
Internal shell pressure	= 0.55 N/mm²
Internal Jacket pressure	= 0.35 N/mm²
Temperature	= 150°C
Material - open flearth steel (15 - 200°C)	
Allowable stress	= 98 N/mm²
Modulus of Elasticity	= 190 × 10³ N/mm²
poisson's Ratio	= 0.3

Q3) a) Explain the functioning of rotary dryers with application. **[8]**

b) Boards with dimensions 1m × 1m × 6 mm are dried from both surfaces. The bone dry density of the board is 250 kg/m³. The boards are dried with air at 50°C from 45% to 5% moisture content. The critical moisture is 22% and the equilibrium moisture is 0.5%. Find the time required for drying. All moisture contents are on wet basis. **[8]**

<div align="center">OR</div>

Q4) a) What type of dryer is used when the product required is a powder? Explain in detail. **[8]**

b) A material was dried under constant drying conditions and it was found that 2 hours are required to reduce the free moisture concentration from 20% to 10%. How much longer would be required to reduce the free moisture to 4%? Assume that no constant rate period is encountered.**[8]**

Q5) a) Compare between sieve plates and bubble - cap plates. **[6]**

b) An aqueous stream of acetone is to be distilled in a sieve plate distillation column. Find the diameter of the column for the following conditions.

Minimum feed rate	= 7000 kg/h
Turn down ratio	= 70%
molar feed rate	= 672.9 kmol/h
Vapour rate at top	= 55.5 kmol/h
Vapour rate at bottom	= 162.3 kmol/h
Slope of bottom operating line	= 5.0
Slope of top operating line	= 0.57
Bottom composition	= essentially water

At bottom: ρ_v	$= 0.72 \text{ kg/m}^3;$
$_L$	$= 954 \text{ kg/m}^3.$
Liquid surface tension	$= 57 \times 10^{-3} \text{N/m}$
At top : $_V$	$= 2.05 \text{ kg/m}^3,$
$_L$	$= 753 \text{ kg/m}^3$
Liquid surface tension	$= 23 \times 10^{-3} \text{ N/m}$
Take tray spacing	$= 0.5 \text{ m}$
K_1 at bottom	$= 7.5 \times 10^{-2}$
K_1 at top	$= 9.0 \times 10^{-2}$ **[12]**

OR

Q6) a) Describe the Van Winkle method for predicting plate efficiency. **[6]**

b) What is down comer back - up? What are the various heads to be considered while calculating plate pressure drop. **[6]**

c) What are steps involved in the hydraulic design of the plate? **[6]**

SECTION - II

Q7) a) Explain the characteristics & functioning of **[12]**

   i) Liquid distributors. ρ

   ii) Liquid redistributors.

   iii) Supports for packings.

   iv) Hold - down plate.

b) What is the significance of mGm/Lm in the design of packed column. **[6]**

OR

Q8) a) Give the equations and explain all the terms in cornell's method. **[12]**

b) What are the effects of liquid maldistribution in packed column? **[6]**

Q9) a) Design a decanter for separation of oil and water, oil being dispersed phase.

Oil flow rate	=	1100 kg/h
Density of oil	=	900 kg/m^3
Viscosity	=	3 mNs/m^2
Water flow rate	=	5000 kg/h
Density of water	=	1000 kg/m^3
Viscosity	=	3 mNs/m^2
Droplet diameter	=	150 m. **[10]**

b) Explain the working of cyclone separator. **[6]**

OR

*Q10)*a) Design a separator for the separation of a mixture of steam and water.

Steam : Flow rate = 2100 kg/h

Density = 2.2 kg/m³

Water : Flow rate = 1000 kg/h

Density = 930 kg/m³

Operating pressure = 4 bar **[10]**

b) What are the safety devices used in pressure vessels to prevent excessive pressure built - up. **[6]**

*Q11)*a) Explain design of pipelines based on fluid dynamic parameter. Give details of any one case. **[8]**

b) What are the various types of supports used for piping? **[8]**

OR

*Q12)*a) Give the design considerations in condensate pipeline. **[8]**

b) Water flows through a pipeline @ 1 kg/s., over a distance of 2 km. The impressed head of water = 9.8 m. What is the diameter of pipeline if = 1000 kg/m³ & = 1 mNs/m². **[8]**

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P1198

[4064] - 429

B.E. (Mechanical Sandwich)

COMPUTATIONAL FLUID DYNAMICS

(Sem. - I) (Elective - II) (2008 Course) (402063(B))

Time : 3 Hours]   *[Max. Marks :100*

Instructions to the candidates:

1) *Answer 3 questions from Section I and 3 questions from Section II.*
2) *Answers to the two Sections should be written in separate books.*
3) *Neat diagrams must be drawn wherever necesssary.*
4) *Figures to the right indicate full marks.*
5) *Your answers will be valued as a whole.*
6) *Use of logarithmic tables slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.*
7) *Assume suitable data, if necessary.*

SECTION - I

Q1) a) Explain CFD methodology by giving steps in a CFD simulation in an industrial environment.   **[8]**

b) Derive an equation for conservation of mass in differential form.   **[10]**

OR

Q2) a) Illustrate the use of CFD in any design process by giving any one example.   **[8]**

b) Explain models of flow using control volume & state what are conservation & non - conservation form of equation.   **[10]**

Q3) a) What is a difference expression? Obtain central difference expression of second order for a variable 4 on a grid using Taylor Series.   **[8]**

b) Solve the equation $\dfrac{dy}{dx} = \sqrt{x+y}$ subject to $x = 0$, $y = 1$ to find y at $x = 0.2$ taking $h = 0.1$ **[8]**

OR

Q4) a) Explain what is a consistant partial differential equation. What is advantage of a consistant equations.   **[8]**

b) Discuss advantages & disadvantages of explicit and implicit approach. **[8]**

P.T.O.

Q5) a) What is "transformation" in grid generation? Explain its need with the help of physical & computational plane. **[8]**

   b) What is adaptive grid? What are its advantages. **[8]**

OR

Q6) a) Discuss modern development in grid generation and the un structured grids. **[8]**

   b) List any two types of errors encountered in numerical methods & indicate how the error occer. **[8]**

SECTION - II

Q7) a) What are stability requirements? Explain it with CFL conditions. **[10]**

   b) What is artificial viscosity? Discuss how it affects the solution. **[8]**

OR

Q8) a) Explain Lax - Wendroff technique. **[10]**

   b) Develop the solution algorithm for one dimensional transient heat conduction problem based on explicit scheme. **[8]**

Q9) a) Outline the MAC algorithm for fluid flow solution. **[8]**

   b) List the full procedure for the solution of blasius equation using shooting method. **[8]**

OR

Q10) a) Give details of SIMPLE algorithm. **[8]**

   b) Write Navier - stokes equation for incompressible flow & explain each term. **[8]**

Q11) a) Give advantages & disadvantages of finite volume method. **[6]**

   b) Derive momentum equation with infinitesimally small element fixed in space. **[10]**

OR

Q12) Write short note on any 2 of the below: **[16]**

   a) Finite volume method.

   b) Integral verses differential form of equations.

   c) Use of CFD in civil engineering applications.

   d) Errors in CFD.

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[4064] - 430

P1199

B.E. **(Mechanical S/W)**

FINITE ELEMENT METHOD

(402063(C)) (2008 Course) (Sem. - I) (Elective - II)

Time : 3 Hours]   *[Max. Marks :100*

Instructions to the candidates:

    1)   *Answer any three questions from each section.*

    2)   *Answers to the two Sections should be written in separate books.*

    3)   *Figures to the right indicate full marks.*

    4)   *Use of electronic calculator is allowed.*

    5)   *Assume suitable data, if necessary.*

SECTION - I

Q1) a)   A system of spring is shown in the fig. Determine the overall stiffness matrix and deflection of each spring.   **[8]**
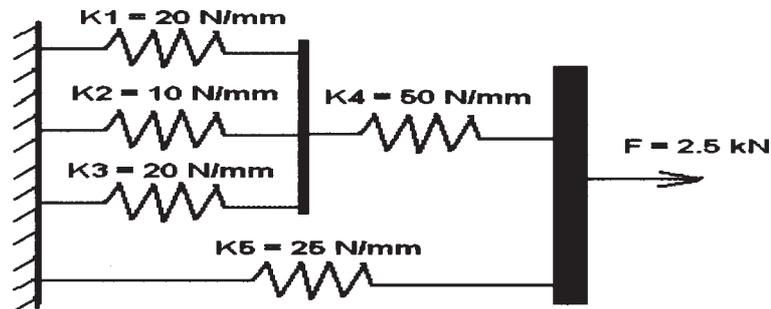
    b)   Explain the following methods for finding an approximate solution to the engineering problems: **[8]**

      i)   Rayleigh-Ritz   ii)   Galerkin

                       OR

Q2) a)   Explain following methods of analysis: **[8]**

      i)   Finite Difference Method

      ii)   Finite Element Method.

      iii)   Finite Volume Method

    b)   What do you mean by FEM errors? Explain various sources of errors.**[8]**

Q3) a) The 1-D element has a length of 200 mm. The temperature at nodes 1 and 2 are 100ºC and 40ºC respectively. Evaluate the shape function associated with nodes 1 and 2, if the temperature is to be estimated at point P with in the element, situated at 150 mm from node. Also calculate temperature at point P. **[6]**

b) State the properties of the global stiffness matrix. **[5]**

c) What is the significance of shape function? Obtain the shape functions, in terms of natural coordinates, for the two - noded 1 - D element. **[5]**

OR

Q4) a) A stepped steel bar of 5 m length and square cross section is suspended vertically at rigid support. The cross section is 100×100 mm for upper 4 m length and 50×50 mm for lower 1 m length. The two sections are coaxial. The modulus of elasticity for steel is 210×103 N/mm², while the specific gravity is 8. The load acting on the bar is only its self - weight. Model the bar with two linear spar elements and determine: **[10]**

i) the global stiffness matrix   ii) the nodal displacement

iii) the stress in each element   iv) the reaction force at support

b) Derive an expression for element stiffness matrix of two nodded truss element. **[6]**

Q5) a) Explain, with suitable examples, the plane stress and plane strain condition. **[6]**

b) Explain shape function of CST element. Also explain the physical representation by area coordinates. **[6]**

c) Discuss the problem Modeling and Boundary Conditions for the following cases: **[6]**

i) A cylinder of infinite length subjected to external pressure.

ii) Belleville spring.

OR

Q6) a) A CST element is defined by nodes at I (50, 60), J (150, 90), and K (100, 140) and the displacements at these nodes are (0.1, 0.5), (0.6, 0.5) and (0.4, 0.3) respectively. Determine the displacement, the natural coordinates and the shape function at point P (100, 90) within the element. **[6]**

b) What is an isoparametric element? Explain with suitable example. **[6]**

c) Write a short note on CST element defects. **[6]**

SECTION - II

Q7) a) The beam of 6m length is fixed at each end. A downward force of 10 kN and moment of 20 kN-m (ccw) act at the center of the beam. Let $E = 210$ GPa and $I = 4 \times 10^{-4}$ m^4 throughout the beam. Determine the displacement and rotation under applied loads. **[10]**

b) Write a short note on Potential energy approach to derive Beam Element equations. **[6]**

OR

Q8) a) Drive stiffness matrix for two - dimensional arbitrarily oriented beam element. **[8]**

b) Explain Beam Stiffness Matrix based on Timoshenko beam theory. **[8]**

Q9) a) Formulate the one - dimensional heat transfer equations using a veriational method. **[10]**

b) Write a short note on 2-D element used for heat transfer problem. **[6]**

OR

Q10) a) Write a short note on Line or Point Sources in heat transfer problems. **[6]**

b) An insulated circular fin has cross sectional area $A = 0.1$ m^2 and length $L = 0.4$m. The left end has a constant temperature of 100ºC. A positive heat flux of $q = 5000$ W/mm^2 acts on the right end. Let $K_{XX} = 6$W/(m–ºC). Determine the temperature at L/4, L/2, 3L/4 and L. **[10]**

Q11) a) What is model analysis? What are mode shapes? **[6]**

b) How to decide finite element density for vibration and acoustic analysis? **[6]**

c) What is difference between static, dynamic and fatigue analysis? **[6]**

OR

Q12) a) Write a short note on NVH analysis. **[6]**

b) Write a short note on Automatic and Semi - automatic mesh generation with an illustrative example. **[6]**

c) What is difference between time domain and frequency domain? **[6]**

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P1200

[4064] - 533

B.E. (Chemical)

CHEMICAL ENGINEERING DESIGN - II

(Sem. - I) (2008 Course) (409345)

Time : 3 Hours]   *[Max. Marks :100*

Instructions to the candidates:

1) *Answer any 3 questions from each section.*

2) *Answers to the two Sections should be written in separate answer books.*

3) *Neat diagrams must be drawn wherever necessary.*

4) *Figures to the right indicate full marks.*

5) *Use of logarithmic tables slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.*

6) *Assume suitable data, if necessary.*

SECTION - I

Q1) a)   What are the different types of jackets? Explain their features.   **[6]**

b)   A reactor has a diameter of 1.2 m and is fitted with an agitator of diameter 0.35 m rotating at 2.5 rps. The temperature is maintained at 305 K by circulating cooling water through a stainless steel helical coil of 0.8 m diam. The flow rate of cooling water is 0.5 kg/S and the I.D. of coil pipe is 25 mm & O.D is 28 mm. Calculate the overall heat transfer coefficient. Data: Water mean temperature of water = 290K Thermal conductivity = 0.59 W/mk, C_p = 4.18 kJ/kgK. Viscosity = 1.08 mNs/m^2, ρ = 998 kg/m^3. Thermal conductivity of stainless Steel = 15.9 J/S m.k.

Dirt resistance at inside & outside surfaces are 0.0002 & 0.0004 m^2 k/W respectively.   **[10]**

OR

Q2) a)   What is the function of stiffening rings?   **[6]**

b)   A pitched blade turbine impeller running at 90 rpm is used for agitating 5000 litres of liquid with a density of 900 kg/m^3 and viscosity of 100 cp. The tank diameter is 1m and the ratio of agitator diameter to tank diameter is 0.4. Find the power required for mixing.   **[8]**

N_{Re}	1000	2000	3000	4000
N_{P}.	1.1	1.2	1.3	1.4

c)   What is the function of diffuser ring in an agitator.   **[2]**

P.T.O.

Q3) a) Give equations for downcorner back-up and plate pressure drop (in terms of head) & explain all the terms. **[6]**

   b) Find the diameter of the plate column for the following: **[12]**
   System : Acetone - water distilled to recover a cetone.

Minimum feed rate to the column	=	9100 kg/h
Turn down ratio	=	70%
Molar feed rate	=	673 kmol/h
No.of ideal stages	=	16
Slope of bottom operating line	=	5.0
Slope of top operating line	=	0.57
Top composition	=	94 mol% acetone
Bottom composition	=	essentially water
Reflux ratio	=	1.35
Vapour rate at the top	=	55.5 kmol/h.
Vapour rate at the bottom	=	162.3 kmol/h.
At the bottom $_V$	=	0.73 kg/m^3
$_L$	=	954 kg/m^3
Bottom pressure	=	1.26 bar
Liquid surface tension	=	57 × 10^{-3} N/m
At the top : $_V$	=	2.05 kg/m^3
ρ $_L$	=	754 kg/m^3,
Pressure	=	1 bar,
Surface tension	=	23 × 10^{-3} N/m
Assume tray spacing	=	0.5m
K_1 bottom	=	7.5 × 10^2,
K_1 top	=	9 × 10^2

   OR

Q4) a) Explain the AICHE method. What factors affect efficiency? **[8]**

   b) A mixture of benzene and tolerance containing 50 mol% benzene is to be continuously distilled in a plate column, to give distillate containing 90 mol% benzene and bottom product containing 90 mol % tolerance. The feed enters the column @10,000 kg/day. The relative volatility is 2.28 and the reflux ratio is 1.5 times the minimum. If the overall plate efficiency is 0.75 calculate the actual number of plates required. Find the column height if plate spacing in 450 mm. **[10]**

Q5) a) Estimate HOG using cornell's method.

  Data: $D_L = 1.9 \times 10^{-9}$ m²/s;

  $D_V = 1.6 \times 10^{-5}$ m²/s

  $_V = 0.015 \times 10^{-3}$ Ns/m².

  $L_W* = 16$ kg/s.m²; K_3 (60% flooding) $= 0.85$,

  $_h = 80$, $_n = 0.1$ NOG $= 8$;

  $_V = 1.3$ kg/m³, $M_{avg} = 29$, $_L = 998$ kg/m³, $D_C = 1.5$m.

  The liquid phase is assumed to have water - like properties. **[8]**

  b) Write in short about **[8]**

  i) Installation of packing

  ii) Liquid hold - up and

  iii) Wetting rates.

<div align="center">OR</div>

Q6) a) Calculate the column diameter for a packed column using the following data:

  Gas flow rate $= 4500$ kg/h.

	0.5	0.6	0.7	0.8	0.9	1.0
NOG	4.8	5.2	6.5	8	10.8	19

$$\frac{hG_m}{L_m}$$

  $F_P = 170$ m⁻¹ $\mu_L = 1 \times 10^{-3}$ Ns/m²

  Operating temperature $= 25°C$. K_4 at operating pressure drop of 20 mm of H_2O/m of packing $= 0.35$

  At flooding $K_4 = 0.8$

  Assume gas properties same as air & liquid properties same as water.**[10]**

  b) What are liquid distributors, their types & function? **[6]**

<div align="center">

SECTION - II

</div>

Q7) a) Explain the three methods for gas liquid separations. **[8]**

  b) Write about safety valves used in process industry. **[8]**

<div align="center">OR</div>

Q8) a) Design decanter giving piping arrangement for the following system.

  Disperse phase - flow rate $= 900$ kg/h, $_d = 850$ kg/m³, $_d$ 3 mNs/m².

  Continuous phase - flow rate $= 4500$ kg/h

  $_c = 995$ kg/m³, $_c = 1$ mNs/m² **[10]**

b) Explain functioning of cyclone separators & their general design procedure. **[6]**

Q9) a) Explain water hammer, its disadvantages and computation. **[6]**

b) Explain thrust is pipelines. **[4]**

c) Write the equations & design considerations for natural gas pipe line.**[8]**

OR

Q10) a) Explain the Hardy Cross methods for network analysis. **[8]**

b) Water is transported through a steel pipe 2 km long @ 2.5 kg/S. The pressure drop across the pipe is 50 kN/m². Find the diameter of the pipeline. Roughness of steel pipe = 4.1×10^{-5}, density of water = 1000 kg / m³, Viscosity of water = 0.8×10^{-3} Ns/m². **[10]**

Q11) a) Give the classification of gaskets and explain each type. **[8]**

b) What are codes & standards? How are they used. **[8]**

OR

Q12) a) How is material selection done for any piping system? **[8]**

b) With the help of an example explain and show what details are given in any standard for a pipe fitting. **[8]**

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P1201

[4064] - 536

B.E. (Chemical)

BIOPROCESS ENGINEERING

(Elective - I) (2008 Pattern) (Sem. - I) (409341(C))

Time : 3 Hours]   *[Max. Marks :100*

Instructions to the candidates:

   1)   *Answer 3 questions from Section I and 3 questions from Section II.*

   2)   *Answers to the two Sections should be written in separate answer books.*

   3)   *Neat diagrams must be drawn wherever necessary.*

   4)   *Figures to the right indicate full marks.*

   5)   *Use of logarithmic tables slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.*

   6)   *Assume suitable data, if necessary.*

SECTION - I

Q1) a)   Write down general structure of monosaccharids and their function?**[6]**

     b)   Explain the role of DNA in cell life cycle.   **[6]**

     c)   Discuss the concept of Biorefinary?   **[6]**

OR

Q2) a)   Explain structure and functions of biomembranes?   **[6]**

     b)   Write short notes on following (Any three)   **[12]**

        i)   Amino acid building blocks and polypeptides.

        ii)   Proteins and their diverse biological applications.

        iii) Cell fractionation.

        iv) Osmoregulations interacting toxins.

Q3) Explain the manufacturing process for   **[16]**

     a)   wine and   b)   vinegar

OR

Q4) Explain the manufacturing process for   **[16]**

     a)   vitamin A and   b)   citric acid

Q5) a)   The following data were used obtained for an enzyme - catalyzed reaction. Determine V_{max} and K_m. The initial rate data is as follows: **[12]**

S(mol/1)	5×10^{-4}	2×10^{-4}	6×10^{-5}	4×10^{-5}	3×10^{-5}	2×10^{-5}	1.6×10^{-5}	1.0×10^{-5}	8×10^{-6}
γ (mol/min)	125	125	121	111	96.5	62.5	42.7	13.9	7.5

Do these data fit into Michaelis - Menten kinetics? If not what kind of rate expression would you suggest? Use graphical method.

b) Discuss the effect of immobilization on rate of enzyme catalyzed reactions? **[4]**

OR

Q6) An enzyme was assayed at an initial substrate concentration of 10^{-5} M. The K_m for the substrate is 2×10^{-5} M. At the end of 1 min, 2% of the substrate has been converted to the product. **[16]**

a) What percent of the substrate will be converted to the product at the end of 3 min? What would be the product and substrate concentrations after 3 min?

b) If the initial substrate concentration were 10^{-6} M, what percent of the substrate will be converted to the product after 3 min?

c) What is the maximum attainable velocity 'V_{max}' with the enzyme concentration used?

d) At about what substrate concentration will 'V_{max}' be observed?

SECTION - II

Q7) a) Explain the kinetic implications of endogenous and Maintenance metabolism? **[10]**

b) Explain the typical growth curve for bacterial population? **[8]**

OR

Q8) a) Derive design equation for CSTR for continuous cultivation of cells and also explain Monod kinetics? **[10]**

b) Explain the ideal reactors used in kinetics of substrate utilization? **[8]**

Q9) a) Explain practical operating boundaries for aerated and agitated fermentors with the help of figure? **[8]**

b) How Oxygen transfer rates are determined and explain measurement of $K_l a'$ using gas liquid reactions? **[8]**

OR

*Q10)*a) Explain advantages and applications of immobilized biocatalysts with suitable example? **[8]**

b) Discuss and compare mechanically agitated contactor and bubble column reactor as fermentor? **[8]**

*Q11)*a) Explain various types of chromatography techniques used in bioprocess? **[8]**

b) Discuss solvent extraction with examples used in bioseparations? **[8]**

<div align="center">OR</div>

*Q12)*Write short notes on: **[16]**
   a) Bioprocess economics.
   b) Electro dialysis.
   c) Electrophoresis.
   d) Ultra - filtration.

<div align="center">☛ ☛ ☛</div>

[4064] - 253

P1202

B.E. (Computer & IT)

OBJECT ORIENTED MODELING AND DESIGN

(2003 Course) (Common) (410443) (Sem. - I)

Time : 3 Hours]   *[Max. Marks :100*

Instructions to the candidates:

    1)   *Figures to the right indicate full marks.*

    2)   *Answers to two Sections should be written in separate answer books.*

    3)   *From Section I, Answer (Q1 OR Q2) AND (Q3 OR Q4) AND (Q5 OR Q6).*

    4)   *From Section II, Answer (Q7 OR Q8) AND (Q9 OR Q10) AND (Q11 OR Q12).*

    5)   *In design questions you are encouraged to make further suitable assumptions on scope of the systems given wherever felt necessary and do state your important assumptions if any.*

SECTION - I

Q1) Write on the following in brief: **[18]**

    a)   Rational Unified Process.

    b)   Platform specific model (Hint Java).

    c)   Usecases.

    d)   Information hiding.

    e)   Changing Requirements.

    f)   UML version 1.4.

OR

Q2) a)   Write short Notes on UML stereotypes.

    b)   Write short Notes on UML.

    c)   Write short notes on new features of UML 2.0

                                                               [18]

Q3) a)   Compare and contrast CLASSES AND OBJECTS.   **[4]**

    b)   What is reverse engineering? Illustrate.   **[4]**

    c)   Give an example EMBEDDED application. How is a deployment diagram useful to describe embedded applications.   **[4]**

    d)   What are Artifacts (Hint: deployment diagram)   **[4]**

OR

P.T.O.

Q4) a) How are software components useful. Consider a college library system? Define its scope. Identify and describe a few components and interfaces for above system. **[8]**

b) Explain the following concepts with examples briefly. **[8]**
   i) packages.
   ii) relationships in package diagrams.

Q5) a) Write short Notes on constraints in UML (with examples) **[6]**

b) Why does one model, explain with good examples. **[6]**

c) Why is UML so popular. **[4]**

OR

Q6) a) Consider software for editing, printing a LETTER. (Hint like Microsoft word). Draw a use case diagram for above system using full UML notation for use case diagrams. **[6]**

b) What do you understand by the following stereotypes. **[6]**
   i) INCLUDES in usecase diagrams.
   ii) dependency (in class diagrams).

c) What are behavioral? Diagrams, give examples (names) **[4]**

SECTION - II

Q7) a) Draw a class diagram for a MUSIC SHOPEE system. Make suitable assumptions about scope and working of your shop (write down the scope too)

The shop sells audio and MP3 CDs, DVDs. The search can be made on various aspects like singer, music director etc. The buying transaction is recorded.

The payment is accepted in cash against the bill. Your class diagram must show relevant attributes, methods, relationships. **[10]**

b) How do you show a Class with attributes, methods, responsibilities in a class diagram, give an appropriate example, and give Notation in UML.**[4]**

c) How do you implement a CLASS with attributes, methods in C++. **[4]**

OR

Q8) a) What are attributes and how to model them in detail in classdiagram.**[4]**

b) What do you understand by the concept of composite structure diagram.**[4]**

c) Draw a class diagram for system described here. Make suitable assumptions about the scope. The restaurant serves only south Indian dishes. There is a standard menu and additional daily items may be announced too. The tables can be reserved in advance. The order is taken by waiter and bill is paid in cash only. And draw classes, attributes, operations, and relationships between Classes. Show which classes are entity, controller, GUI classes. **[10]**

Q9) a) Can an activity diagram be drawn to represent a system process? Justify your answer. Draw an ACTIVITY diagram for a system process to admit a student in a typical junior college and optionally to admit to college hostel and college gym. Make suitable assumptions about the scope.**[10]**

b) Compare "join and merge" versus "fork and join" with a good example.

[6]

OR

Q10) Draw neat fragments on one of the (/interaction overview / state / activity) diagrams to represent the following. Explain the concept too. **[16]**
a) states and transitions.
b) Activity and sub activities.
c) interruptible region.
d) Precondition and post condition in an activity diagram.

Q11) In the context of Interaction diagrams show how to model the following concepts with appropriate examples. **[16]**
a) An OPT frame.
b) A loop.
c) synchronous message and return message.
d) recursion.

OR

Q12) a) Consider a Use Case "Issue a DVD" in a movie rental shop. The movies can be searched optionally. Then one or more DVDs can be rented. The membership validity must be checked before issuing. The confirmation receipt with details like return date must be printed as well as shown on SCREEN. Please make additional assumptions if relevant and appropriate. Identify classes, actors and model a SEQUENCE diagram for above system with best use of UML Notation. **[8]**

b) Draw a simple COMMUNICATION diagram fragment to show objects and messages and actors. **[4]**

c) In the context of interaction diagrams with examples: explain the concept of **[4]**
i) life line.
ii) frames.

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P1204

[4064]-42

B.E. (Mechanical Engineering (Sandwich))
INDUSTRIAL HYDRAULICS AND PNEUMATICS
(2003 Course) (402062) (Sem. - I)

Time : 3 Hours] *[Max. Marks : 100*

Instructions to the candidates:

1) *Answer any three questions from each section.*
2) *Answers to the two sections should be written in separate answer books.*
3) *Neat diagrams must be drawn wherever necessary.*
4) *Figures to the right indicate full marks.*
5) *Use of electronic pocket calculator is allowed.*
6) *Assume suitable data if necessary.*

SECTION - I

Q1) a) List out with their functions; different components of a Hydraulic system. **[6]**

b) Oil of specific gravity 0.8 and kinematic viscosity 186mm²/s flows through a 300m smooth pipe connecting two tanks where the surface level difference is 0.16m. Ignoring losses other than pipe friction; determine the size of pipe necessary for a flow rate of 89 l/s. **[6]**

c) Discuss the effect of temperature and pressure on fluid properties. **[6]**

OR

Q2) a) Compare Hydraulic, Pneumatic, Electrical and Mechanical systems. **[6]**

b) Discuss, various Fluid conditioning elements used in Hydraulic systems. **[6]**

c) What is the difference between static and dynamic power transmission?**[6]**

Q3) a) Explain, how Accumulator size is determined for different operating conditions? **[8]**

b) Compare characteristics of Gear, Vane and Piston pumps. **[8]**

OR

Q4) a) Draw and explain balanced type Vane pump. **[6]**

b) Explain constructional details of Hydraulic power unit with the help of a neat diagram. **[10]**

Q5) a) What are the advantages of Cartridge valves? Explain constructional details. **[8]**

    b) Draw and explain sequence valve and Pressure Reducing valve. **[8]**

<div align="center">OR</div>

Q6) a) What are the different centre positions available in direction control valves used in hydraulics? Explain applications of such direction control valves with different centre positions. **[8]**

    b) Draw symbols of the following : **[8]**

        i)   Counterbalance valve.
        ii)   Pilot operated check valve.
        iii) Quick Exhaust valve.
        iv) Shuttle valve.
        v)   Intensifier.
        vi) 4/3 closed center direction control valve.
        vii) Variable displacement hydraulic pump.
        viii) Gravity return cylinder.

<div align="center">

SECTION - II

</div>

Q7) a) Draw Meter-in and Meter-out circuits. Compare them. **[8]**

    b) What is the Mounting of a cylinder? Explain different ways of mountings. **[8]**

<div align="center">OR</div>

Q8) a) Draw and explain Motor Braking circuit. **[8]**

    b) Draw and explain pump unloading circuit. **[8]**

Q9) a) Explain : FRL unit used in pneumatics. **[8]**

    b) Explain any two types of air motors with neat sketches. **[8]**

<div align="center">OR</div>

Q10) a) Explain any two applications of pneumatics in Automation. **[6]**

    b) What are the advantages of pilot operated systems? Explain any typical pilot operated pneumatic circuit. **[10]**

Q11) a) What is the importance of performance characteristics of a flow control valve? Interpret the performance curves of 3 different Inline flow control valves given in figure no.1. **[9]**
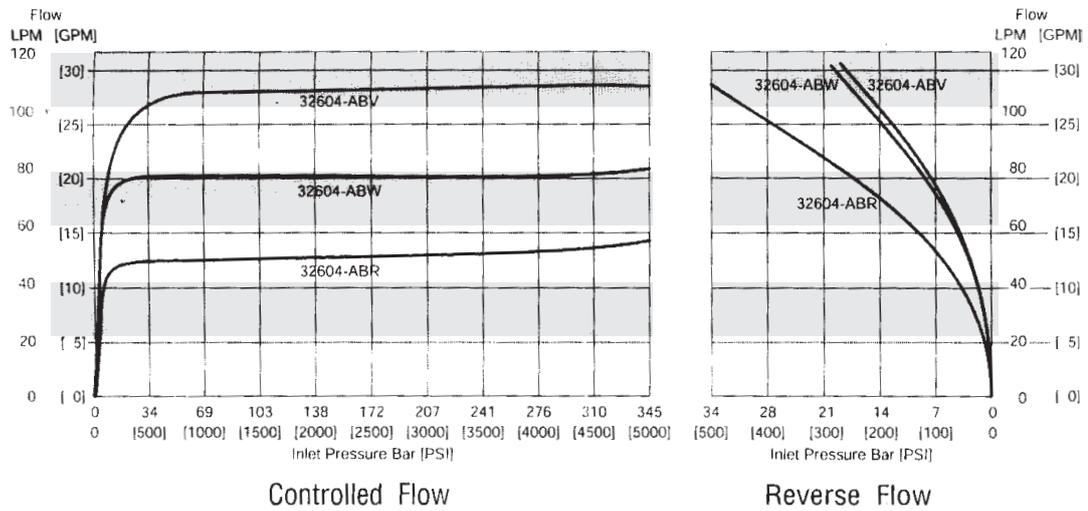
Figure No 1: Performance curves of Inline flow control valves

b) How to test Pressure Relief Valve? Explain the terms used in. **[9]**

OR

Q12) a) A pneumatic system has two cylinders. The sequence of their operations is as follows : **[9]**

i) Cylinder 1 extends.
ii) Cylinder 2 extends.
iii) Cylinder 2 retracts.
iv) Cylinder 1 retracts.

Propose a pneumatic circuit to fulfill above requirements. Do not use solenoid operated valves.

b) Explain with the help of suitable circuits how Synchronizing movement of hydraulic rams is obtained. **[9]**

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[4064] - 254

P1206

B.E. (Computer Engg.)
PRINCIPLE OF COMPILER DESIGN
(2003 Course) (410444) (Sem. - I)

Time : 3 Hours]   *[Max. Marks :100*

Instructions to the candidates:
1) *Answer three questions from each section.*
2) *Answers to the two sections should be written in separate answer books.*
3) *Neat diagrams must be drawn wherever necessary.*
4) *Figures to the right indicate full marks.*
5) *Assume suitable data, if necessary.*

SECTION - I

Q1) a) What is bootstrapping process in compiler design? How does it related to the cross compilers? **[6]**

b) Explain in detail the process of compilation. Explain the output of each phase for the following statement

$T1 = T2 * T3 + 2*6.3 + 2*T2.$ **[10]**

OR

Q2) a) Explain various compiler construction tools for the compiler design.**[4]**

b) Explain in detail the various phases of a compiler, describe the output for the following expression after each phase. Considering and without considering the precedence and associativity of operators.

$a = b * c + c * b.$ **[12]**

Q3) a) Write LEX input specification that will produce a program that capitalizes all comments in a C program. **[6]**

b) Write regular definitions for the following languages **[10]**

    i) All the strings of lowercase letters that either begin or end in '*a*' (or both).

    ii) All strings of digits that contain no leading zeroes.

    iii) All strings of digit that represents even numbers.

    iv) All string of *a*'s and *b*'s that contain exactly as many *a*'s as *b*'s.

OR

Q4) a) In a string of length *n*, how many of the following are there? **[6]**

    i)   Prefixes.

    ii)   Suffixes.

    iii) Substrings.

    iv) Proper prefixes.

    v)   Subsequences.

  b) Specify the lexical form (regular definition and DFA) of numerical constants, identifiers and keywords in the 'C' programming language.**[10]**

Q5) a) Every SLR(1) grammar is unambiguous. **[10]**

    But for the following unambiguous grammar prove that it is not SLR(1)

    $S \rightarrow L = R$

    $S \rightarrow R$

    $L \rightarrow *R$

    $L \rightarrow id$

    $R \rightarrow L$

  b) Consider the grammar

    $S \rightarrow (L) / a$

    $L \rightarrow L, S / S$

    i)   What are the terminal, nonterminal and start symbol.

    ii)   Find the parse trees for (a, a), and (a, (a, a)).

    iii) Construct leftmost derivation for (a, a) and (a, (a, a)).

    iv) Construct rightmost derivation for (a, a) and (a, (a, a)). **[8]**

<div align="center">OR</div>

Q6) a) Construct shift reduce parser for the grammar

    $S \rightarrow aABe$

    $A \rightarrow Abc / b$

    $B \rightarrow d$

    Show the shift reduce action for 'abbcde'. **[10]**

  b) Consider the grammar **[8]**

    $S \rightarrow aSbS / bSaS / \in$

    i)   Show that this grammar is ambiguous.

    ii)   What language this grammar generates.

    iii) Construct the rightmost derivation for 'abab'

    iv) Construct the parse tree for 'abab'.

SECTION - II

Q7) a) What are the steps will be followed at caller and callee for creation of activation record when we call the function and when we return the value from function? Explain with following example.

```
#include<stdio.h>
int x, y;
int gcd(int u, int v)
{
If(v==0) return u;
Else return gcd(v, u%v);
}
Main()
{
Scanf("%d%d",&x,&y);
Printf(""%d\n",gcd(x,y));
Return 0; }
```
[12]

b) What is S-attributed definition and L-attributed definition? How conversion of L-attributed to S-attributed definition is done? **[6]**

OR

Q8) a) What is syntax directed translation and syntax directed definition? How inherited attributes and synthesized attributes help for syntax directed definition and translation. **[6]**

b) Give the output of the following program using the following parameter passing methods. **[12]**
   i)   Pass by value
   ii) Pass by reference
   iii) Pass by name
   iv) Pass by value result.

```
#include<stdio.h>
int i = 0;
Void p(int x, int y)
{
x + = 1;
i + = 1;
y + = 1;
}
```

```
Main()
{
int a[2] = {1, 1}
p(a[i], a[i]);
printf("%d %d\n", a[0], a[1]);
Return 0;
}
```

Q9) a) Consider the following code that produces a 10*10 identity matrix. **[12]**

```
for (i=1; i=10; i++)
{
for (j=1; j=10; j++)
  {
     A[i, j] = 0;
} }
for (i=1; i=10; i++)
{
A[i, i]=1;
}
```

Construct the

i) Three address code.

ii) Basic blocks.

iii) Flow graph.

b) How do we represent the type expression and check the equivalence of two type expression given? **[4]**

<div align="center">OR</div>

Q10) a) Generate the code for following C program. **[12]**

```
main()
{
  int i;
  int a[10];
  while(i<=10)
  a[i] = 0;
}
```

b) What is type systems and type checking? What are the type checking functions? **[4]**

Q11) a) Consider the following code that produces a 10*10 identity matrix.**[10]**

```
for (i=1; i=10;i++)
{
for(j=1;j=10;j++)
  {
    A[i,j]=0;
  }}
  for(i=1;i=10;i++)
  {
  A[i,i]=1;
  }
```

What kind of code optimization can you suggest for the above code apply the same on the given code?

b) Explain the following concerns related to code optimization **[6]**

i) Instruction selection.

ii) Copy propagation.

iii) Constant propagation.

OR

Q12) a) Perform the following the code fragment given below. **[10]**

```
for(i=1;i=n;i++)
{
for(j=1;j=n;j++)
{
C[i,j]=0;
}}
for(i=1;i=n;i++)
 {
  for(j=1;j=n;j++)
  {
   For(k=1;k=n;k++)
{
  C[i,j]=C[i,j] + A[i, k]*B[k,j];
}}}
```

      i)   Partition into basic block

      ii)   Find loops in basic block

      iii)   Move the loop invariants outside the loop.

b) Explain the following concerns related to code optimization   **[6]**

      i)   Register allocation.

      ii)   Evaluation order.

      iii)   Algebraic transformations.

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P1207

[4064]-258

B.E. (Computer Engineering)
MULTIMEDIA SYSTEMS
(2003 Course) (410445) (Elective - I) (Sem. - I)

Time : 3 Hours]   *[Max. Marks : 100*

Instructions to the candidates:

1) *Answer Q. 1 or Q. 2, Q. 3 or Q. 4, Q. 5 or Q. 6 from section-I and Q. 7 or Q. 8, Q. 9 or Q. 10, Q. 11 or Q. 12 from section-II.*
2) *Answers to the two sections should be written in separate answer sheet.*
3) *Neat diagrams should be drawn wherever necessary.*
4) *Figures to the right indicate full marks.*
5) *Use of electronic pocket calculator is allowed.*
6) *Assume suitable data if necessary.*

SECTION - I

Q1) a) What is Multimedia? Explain the Goals and Objectives of Multimedia.**[8]**

b) What is Multimedia Authoring? State and explain various types of Multimedia authoring tools.   **[8]**

OR

Q2) a) What are the basic components of multimedia? Why do we need multimedia?   **[8]**

b) Explain multimedia document architecture in detail.   **[8]**

Q3) a) State and explain different characteristics of multimedia DBMS.   **[8]**

b) Explain the integration in Database Model with reference to multimedia DBMS.   **[8]**

OR

Q4) State the different resources of computer system. How they are managed by Operating System.   **[16]**

Q5) a) Compare BMP and TIFF file formats.   **[10]**

b) Explain with example the block diagram of basic image processing system.   **[8]**

OR

Q6) a) Explain color image processing in detail.   **[8]**

b) Compare Lossy and Lossless compression techniques giving examples.   **[10]**

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SECTION - II

Q7) a) Explain MPEG-IV File format used for Audio. **[8]**

b) Write short note on : **[8]**

    i) WAV file format.

    ii) VOC file format.

OR

Q8) a) List and explain the various elements of Audio Systems. **[8]**

b) Explain MIDI file format in detail. **[8]**

Q9) a) Describe the basics of VRML in brief. **[8]**

b) Explain Virtual objects in detail. **[8]**

OR

Q10) a) What is Virtual Reality? Explain the norms for Virtual Reality. **[8]**

b) Explain different types of Virtual Reality devices in detail. **[8]**

Q11) a) Explain different techniques of animations along with example. **[8]**

b) What is 3D Animation? How it is used in development of web based applications. **[10]**

OR

Q12) a) Explain in detail how multimedia is used in ATM. **[10]**

b) How UNIX operating system supports Multimedia. **[8]**

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P1208

[4064] - 408
B.E. (Civil)
ADVANCED GEOTECHNICAL ENGINEERING
(2008 Course) (New) (Elective - I) (401004(E)) (Sem. - I)

Time : 3 Hours]   *[Max. Marks : 100*

Instructions to the candidates:

1) Answer 3 questions from Section - I and 3 questions from Section - II.
2) Answers to the two sections should be written in separate answer books.
3) Neat diagrams must be drawn wherever necessary.
4) Your answers will be valued as a whole.
5) Use of electronic pocket calculator is allowed.
6) Assume suitable data, if necessary.

SECTION - I

Q1) Explain the following :

   a)   Textural classification.   **[4]**

   b)   HRB classification.   **[4]**

   c)   USCS classification.   **[4]**

   d)   Clay minerals.   **[4]**

OR

Q2) a)   The following data on consistency limits are available for two soils <u>A & B</u>.

		Soil 'A'	Soil 'B'
i)	Plastic lt.	16%	19%
ii)	Liquid lt.	30%	52%
iii)	Flow Index	11	0.6
iv)	Nat. water content	32%	40%

Find out of <u>'A' & 'B'</u>, which soil is,

A)   More plastic.

B)   Better foundation material.

C)   Better shear strength.

D)   Toughness Index.   **[6]**

b) A soil sample from a foundation site has following data,
   i) Total mass of soil sieved = 200 gms,
   ii) Cumulative mass retained on 4mm sieve = 30 gms,
   iii) .... ,, ... 75 μ sieve = 150 gms,
   iv) D_{10} = 0.07 mm, D_{30} = 0.12 mm, D_{60} = 1.95 mm,
   v) Zh = 38%, Ph = 28%,
   Classify the soil according to USCS & comment on the suitability of soil for foundations. **[6]**

c) Explain the role of 'Montmorillonite' in geotechnical engg. **[4]**

Q3) a) A retaining wall 4m high, with a vertical back supports a back fill with horizontal ground surface, the soil has following properties, **[9]**
   i) γ = 18 kN/m³ ii) φ = 35° iii) δ = 20° (Angle of wall friction)
   A footing, running parallel, to the retaining wall & carrying a load intensity of 18 kN/m, is to be constructed, Find the safe distance of the footing from the face of the wall so that there is no increase in lateral pressure on the wall, due to the load of the footing.

b) Design a gravity retaining wall, 5m. High with vertical back to retain a dry sand with γ = 18 kN/m³ & φ = 30°. Find also the FOS against sliding assuming μ bet^n base of wall & the foundation soil at 30°. The wall is to be 1m at the top & to be constructed with concrete having γ = 22 kN/m³. Use Rankine's theory. **[9]**

OR

Q4) a) Explain steps for 'Poncelet's construction', for active earth pressure.**[6]**
   b) Derive the expression for 'K_o'. **[6]**
   c) Explain the following. **[6]**
      i) Cantilever sheet pile design.
      ii) Design of bracings for open cut.

Q5) a) Explain types & functions of geosynthetics. **[5]**
   b) Discuss the applications of geosynthetics in geoenvironment. **[5]**
   c) Discuss 'Binquette & lee' theory for reinforced soil foundation. **[6]**

<center>OR</center>

Q6) a)   Explain the properties & functional requirement of geogrid.   **[5]**

b)   Discuss the steps for construction of reinforced embankment.   **[5]**

c)   What is 'soil nailing'? Under which situations it's applicable?   **[6]**

<center>**SECTION - II**</center>

Q7) Explain the following :

a)   Soil as a mass spring system.   **[4]**

b)   Barken's method.   **[4]**

c)   Pauw's Analysis.   **[4]**

d)   Elastic half space method.   **[4]**

<center>OR</center>

Q8) a)   Resonance occurred at a frequency of 22 cycles per second in a vertical vibration test of a block / mx / mx/ m. Determine C_u of the soil, if the weight of the oscillator is 65 kg & the force produced by it at 12 cycles/sec is 100 kg.   **[8]**

b)   A machine having a total weight of 20,000 kN has an unbalance such that it's subjected to a force of magnitude 5,000 kN at a frequency of 600 rpm. What should be the spring constant for the supporting springs if the max, force transmitted into the foundation due to the machine is to be 500 kN? Neglect Damping.   **[8]**

Q9) Explain the following :

a)   Compaction Piles.   **[4]**

b)   Sand drains.   **[4]**

c)   Grouting.   **[4]**

d)   Vibroflotation.   **[4]**

<center>OR</center>

*Q10)*a)   Explain the steps for design of sand drains with soil,   **[8]**

   i)   Isotropic case.

   ii)   Anisotropic case.

b)   Explain the steps for vibroflotation with inserting reinf, upto freezing of soil, with neat sketches.   **[8]**

*Q11)*Discuss the following,

   a)   Rheology & Rheological models.   **[5]**
   b)   Compound Rheological models.   **[5]**
   c)   Viscous models with spring & dashpot.   **[4]**
   d)   Creep.   **[4]**

<div align="center">OR</div>

*Q12)*a)   Discuss the basic & composite Rheological models.   **[6]**
   b)   Explain 'Secondary Consolidation'.   **[6]**
   c)   Discuss the 'creep' by giving suitable example.   **[6]**

<div align="center">❖ ❖ ❖ ❖</div>

P1209

[4064]-433

B.E. (Mechanical S/W)

ROBOTICS

(2008 Course) (Sem. - I) (402064(C)) (Elective - III)

Time : 3 Hours]   *[Max. Marks : 100*

Instructions to the candidates:

1) *Answer any three questions from each section.*
2) *Q. No. 1 and 10 are compulsory.*
3) *Answers to two sections should be written in separate books.*
4) *Figures on right indicate full marks.*

SECTION - I

Q1) a) Sketch and explain the concept of work enevelope (or work volume) with reference to **[6]**
   i) Cartesian robot.
   ii) Polar Robot.

   b) Explain the terms : **[6]**
   i) Accuracy.
   ii) Precision.
   iii) Resolution-as used in Robotics.

   c) Compare the advantages and disadvantages of Hydraulic and electric drives. **[6]**

Q2) a) State three laws of Robotics explain the importance of third law. **[8]**

   b) Explain any four important parameters used for evaluating robot performance. **[8]**

OR

Q3) a) Explain the method of classification of Robots based on geometric configuration. Write in brief about the characteristics of these robots.**[8]**

   b) Explain with neat sketches different joints used in Robots. **[8]**

Q4) a) Explain with neat sketch one type each of **[8]**
   i) Position sensor.
   ii) Force sensor.

   b) State any four types of grippers. What are different factors to be considered in selection and design of grippers. **[8]**

P.T.O.

Q5) a) "Selection of appropriate sensors is an important step in Robot design". Elaborate this with reference to **[8]**

    i)   A pick and place cartesian robot for handling cartings-wt 10kgs.

    ii)   A spot welding jointed arm Robot with a reach of 1.5mts radius.

b) Compare vaccum grippers Vs mechanical grippers. **[8]**

SECTION - II

Q6) a) Explain Denavit-Hartenberg parameters for assigning frames to links and identifying joint-link parameters and explain their limitations. **[10]**

b) A planar 3R manipulator as shown in fig 6 (b), has link lengths $l_1 = 100$mm, $l_2 = 80$mm and $l_3 = 60$mm. Determine it's reachable workspace and state whether point (200, 100) is reached with $\theta_1 = 40°$. If yes, what are the values of θ_2 and θ_3? If no, what should be the minimum value of θ_1 so that the point will be reached by the manipulator? **[6]**
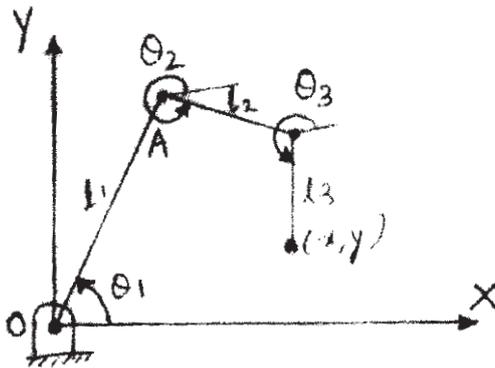
Fig 6 (b)

OR

Q7) a) Explain dynamic model of a 2 DOF planar RR manipulator and get expressions for EOM of the same. **[10]**

b) A camera locates an object by **[6]**

$$^{Camera}T_{object} = \begin{bmatrix} 0 & -1 & 0 & 50 \\ 1 & 0 & 0 & -75 \\ 0 & 0 & 1 & 20 \\ 0 & 0 & 0 & 1 \end{bmatrix}$$

The camera is then translated by 15 units along Z-axis of the object, then rotated about its own X-axis by - 90°. Determine the new relation between camera and object.

Q8) a) What is a vision system? How can vision systems be classified? Explain the categories. **[8]**

b) Explain in brief various power transmitting devices in robots with advantages of each. **[8]**

OR

Q9) a) Describe imaging devices and image processing techniques used in a robot. **[10]**

b) Explain how belts, cables and chains are used for power transmission and how can preload be eliminated? **[6]**

Q10) a) Write short note on methods of robot programming. **[6]**

b) Describe robot language elements and their functions. **[6]**

c) Explain in brief three different search techniques with respect to AI in robots. **[6]**

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P1217

[4064]-87

B.E. (Electrical)
ILLUMINATION ENGINEERING
(2003 Course) (403143) (Elective - I) (Sem. - I)

Time : 3 Hours]　　　　　　　　　　　　　　　　　*[Max. Marks : 100*

Instructions to the candidates:

1) *Answer three questions from Section-I and three questions from Section-II.*
2) *Answers to the two sections should be written in separate answer books.*
3) *Figures to the right indicate full marks.*
4) *Use of logarithmic tables, slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.*
5) *Assume suitable data, if necessary.*

SECTION - I

Q1) a) What is 'photometer'? Explain Bench photometer with a neat sketch.**[8]**

　　 b) Deduce the relation to find the illumination at any point on the plane surface due to light source suspended at a height 'h' meters from the plane surface. **[8]**

OR

Q2) a) Define the following terms : **[6]**
　　　　 i) Illumination.
　　　　 ii) Reflection factor.
　　　　 iii) Lamp efficiency.
　　　　 iv) M.H.C.P.
　　　　 v) Luminous intensity.
　　　　 vi) M.S.C.P.

　　 b) Explain plane angle and solid angle. Also derive relation between them.**[5]**

　　 c) What are the various methods of controlling natural light? **[5]**

Q3) a) What is stroboscopic effect? How it can be avoided? **[6]**

　　 b) Write short note on High pressure mercury vapour lamp. **[6]**

　　 c) Enlist the advantages of gas discharge lamp over incandescent lamp.**[6]**

OR

Q4) Explain any three with sketch : **[18]**

    a) SOX Lamp.

    b) C.F.L.

    c) Metal Halide Lamps.

    d) L.E.D's.

Q5) a) Explain with neat sketch the starting ballast for **[8]**

        i) Sodium vapour.

        ii) Mercury vapour lamp.

    b) Explain the following with neat sketches. **[8]**

        i) Specular reflection.

        ii) Diffused reflection.

<div align="center">OR</div>

Q6) a) Discuss the various types of lighting fillings according to the level of luminous flux. **[8]**

    b) Explain in brief the following : **[8]**

        i) Dispersive reflector.

        ii) Concentrating reflector.

<div align="center">

SECTION - II

</div>

Q7) a) What is glare? Discuss the type of glare and the remedies over them.**[8]**

    b) Explain the terms : **[8]**

        i) Beam factor.

        ii) Waste light factor.

        iii) Payback Period.

        iv) Space height ratio.

<div align="center">OR</div>

Q8) a) What is polar curve? Describe its types. How it is helpful for an illumination engineer. **[8]**

    b) Discuss the factors of good lighting design in detail. **[8]**

Q9) a) What is energy efficient lighting? Discuss its advantages, which are the difficulties related with energy efficient lighting. **[8]**

    b) What are the types of lighting fixtures according to installation type?**[8]**

<div align="center">OR</div>

Q10) a) Write short note on : **[8]**

        i) Street lighting.

        ii) Flood lighting.

b) Give the comparison between different types of light sources with reference to their lumens per watt and life. **[8]**

Q11) a) Define day light factor. Discuss the components of daylight factor, with neat sketches. **[6]**

b) Explain the concept of cold lighting. **[6]**

c) Write short note on photovoltaic lighting. **[6]**

OR

Q12) a) Explain Emergency Lighting scheme with neat block diagram. In case of
i) Central System. **[10]**
ii) Stand alone system.

b) Write short note on : **[8]**
i) Switching control for light.
ii) O.F.C.

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[4064] - 108

B.E. (Electronics)

ADVANCED COMMUNICATION ENGINEERING

(Sem. - I) (Elective - I) (2003 Course) (404205)

Time : 3 Hours]   *[Max. Marks :100*

Instructions to the candidates:

1) *Answer any 3 questions from each section.*

2) *Answers to the two Sections should be written in separate answer books.*

3) *Neat diagrams must be drawn wherever necessary.*

4) *Figures to the right indicate full marks.*

5) *Use of logarithmic tables slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.*

6) *Assume suitable data, if necessary.*

SECTION - I

Q1) a) Define a microwave T junction. Explain why the E-H phase T_{ee} reffered to as a Magic T_{ee}. **[4]**

b) Explain the action of Isulators, gyrators and circulators using ferrites. Mention Applications. **[8]**

c) An air filled rectangular waveguide of inside dimensions 6×3 cm operates in TE_{10} mode.

   i) Find the cutoff frequency.

   ii) Determine the guided wavelength at the same frequency. **[6]**

OR

Q2) a) Explain Reflex Klystron with its operating characteristics. **[8]**

b) How is bunching achieved in Cavity Magnetron? Explain the phase focusing effect. **[8]**

c) Define 'Group Velocity' **[2]**

Q3) a) Explain principle of operation of Tunnel diode and also comment on V-I characteristics. **[8]**

b) A GaAs 'device has a thickness of 0.45 μm and doping concentration Nd = 5×10^{17} cm^{-3}. Relative dielectric constant $_r$ = 13.10. Calculate pinch-off voltage. **[8]**

OR

Q4) a) Discuss the difference between transferred electron devices and avalanche transit time devices. **[8]**

b) With a neat diagram explain MESFET. **[8]**

P.T.O.

Q5) a) Classify Radar Systems and explain indetail one of the systems. **[8]**

b) Derive the expression for free space Radar range. **[8]**

OR

Q6) a) What are the basic differences between a search radar and tracking radar? Discuss various scanning techniques and tracking mechanisms. **[8]**

b) Explain A-scope and PPI displays with reference to radars. What are their limitations? **[8]**

SECTION - II

Q7) a) Explain principle, concept and applications of an OTDR for optical fiber communication. **[8]**

b) Calculate Numerical Aperture of a step index fiber having $n_1 = 1.46$ and $n_2 = 1.44$. What is maximum entrance angle of this fiber if other medium is air with $n_0 = 1.00$? **[6]**

c) What is dispersion? Explain intermodal dispersion and intramodal. Dispersion. **[4]**

OR

Q8) a) Describe Block diagram of OFC link. **[4]**

b) What is Link - Budget in an OFC? **[6]**

c) Explain different types of bending effects in an optical fiber. **[8]**

Q9) a) Draw and explain Functional architecture. of GSM. **[8]**

b) Compare TDM, CDMA and WCDMA. **[8]**

OR

Q10) a) Describe different types of Hand-offs in a mobile communication. **[8]**

b) Explain OFDM in detail and its advantages over other systems. **[8]**

Q11) a) For an Geo station any satellite. What are the specifications? Discuss advantages & limitations of the system. **[8]**

b) For a c-band satellite (Down link freq 4 GHz) has a diameter of about 3.6 meter and an efficiency of 6090. Calculate its gain and beam width. **[8]**

OR

Q12) a) Explain satellite constellations in detail with suitable diagram. **[8]**

b) How the spectrum issues are handed to have optimum utilization? **[8]**

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P1221   **[4064]-485**

B.E. (Electronics)

ROBOTICS AND AUTOMATION

(404204 (D)) (2008 Pattern) (Sem. - I) (Elective - II)

Time : 3 Hours]   *[Max. Marks : 100*
Instructions to the candidates:
   1) Answer any three question from each section.
   2) Answers to the two sections should be written in separate books.
   3) Neat diagrams must be drawn wherever necessary.
   4) Figures to the right indicate full marks.
   5) Use of electronic pocket calculator is allowed.
   6) Assume suitable data, if necessary.

SECTION - I

Q1) a) With the help of neat diagram show the components of robot system? Also explain function of each component. **[10]**

    b) Explain the following terms: **[8]**

       i)   DOF.

       ii)   Work envelop.

       iii)   Payload.

       iv)   Precision & accuracy.

<div align="center">OR</div>

Q2) a) Classify the robot based on the type of joints. Explain all the types in detail with neat sketches? **[10]**

    b) Differentiate between: **[8]**

       i)   Reach & stroke

       ii)   Revolute joint & prismatic joint.

Q3) a) What is composite transformation Matrix? Explain the rules to be followed in the formation of the same. **[8]**

    b) Explain the term-inverse solution. Explain geometric approach for obtaining inverse solution. **[8]**

Q4) a) What is screw transformation matrix & inverse STM? Define screw pitch & state special property of screw transformations. **[8]**

b) Explain the term robot arm dynamics. Discuss Kane's Method used for formulation of dynamical equations. **[8]**

Q5) a) What is the function of gears in robotics? State different gear types. Describe how they are used. **[8]**

b) Explain the following mechanisms with neat diagram (any 2): **[8]**

i) Rack & pinion mechanism.

ii) Cams & Crank's mechanism.

iii) Slider - Crank mechanism.

OR

Q6) a) With the help of neat block diagram explain the operation of laser range finder. **[8]**

b) Write short note on (any two): **[8]**

i) Quadrature encoders.

ii) Accelerometers.

iii) Slip sensor.

SECTION - II

Q7) a) Draw the block diagram of fuzzy controller & explain. **[8]**

b) A 3 axes Cartesian coordinate robot is to move from position (x, y, z) = (0,0,1200) to position (x, y, z) = (2000, 1500, 0). all distances are in mm. The maximum velocities along x and y are 1000 mm/sec, along z is 500 mm/sec. **[10]**

Determine the travel time in the following cases:

i) One axis at a time.

ii) Slew motion.

iii) Joint interpolation.

OR

Q8) a) What is jacobian control? Discuss the jacobian in terms of D-H matrices. **[10]**

b) Explain the types of motion used while trajectory planning. **[8]**

Q9) a) What are different types of vision sensors used in robotics? Explain any one of them with the help of neat sketch. **[8]**

b) Write short note on (any 2): **[8]**

 i) Partitioning & mapping.

 ii) Object recognition.

 iii) Motion Detection.

OR

Q10) a) What is image segmentation? Explain in brief different challenges encountered in real world video for segmentation. **[8]**

b) Explain applications of robot vision system. **[8]**

Q11) a) Write a brief note on "Role of robotics in industrial automation"? **[8]**

b) Write notes on: **[8]**

 i) Intelligence in robot.

 ii) Welding automation using robot.

OR

Q12) Write short note on: **[16]**

a) Automatic assembly operations.

b) Need for automation.

c) Robots in industry.

d) Automatic part inspection system using robots.

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[4064]-11
B.E. (Civil)
GEOINFORMATICS
(2003 Course) (Elective - I) (Theory) (401005) (Sem. - I)

Time : 3 Hours]   *[Max. Marks : 100*

Instructions to the candidates:

1) *Answer any three questions from each section.*
2) *Answer to the two sections should be written in separate books.*
3) *Neat diagrams must be drawn wherever necessary.*
4) *Figures to the right indicate full marks.*
5) *Assume suitable data, if necessary.*

SECTION - I

Q1) a) Explain the typical EMS. State the characteristics of different frequencies. **[12]**

    b) Explain interaction of EMR with Earth's Surface. **[6]**

<div align="center">OR</div>

Q2) a) What are the elements of Visual Image Interpretation? Explain their significance and factors influencing them. **[12]**

    b) Explain types of Resolution. **[6]**

Q3) a) What is image enhancement? Explain its various techniques. **[12]**

    b) Write a note on : **[4]**

      i) Image Rectification.
      ii) Geo referencing.

<div align="center">OR</div>

Q4) a) Explain the term "Histogram Equalization". Elaborate the Linear and Non Linear contrast stretch enhancement. **[12]**

    b) Explain Supervised Classification. **[4]**

Q5) a) Explain with neat sketches the working of GPS in association with different segments. **[12]**

    b) What are applications of GPS in Civil Engineering? **[4]**

<div align="center">OR</div>

Q6) a) What are the different types of errors in GPS observations and explain how to minimize it? **[12]**

b) Write a note on Codes used in GPS. **[4]**

SECTION - II

Q7) a) What are the different types of Map Projection Systems? Explain the needs of different types of Map Projection. **[12]**

b) Explain : **[6]**

    i) Digital Elevation Model.

    ii) Vector and Raster Model.

OR

Q8) a) What is GIS? Explain in detail its components. **[12]**

b) Write a note on : **[6]**

    i) Attributes.

    ii) Data types in DBMS.

Q9) a) Explain any one GIS software's and write a detail account on its Modules. **[12]**

b) What are the components of DBMS. **[4]**

OR

Q10) a) What is RDBMS? Explain the Normal form with one example. **[12]**

b) Write a Note on Primary Key and Foreign Key. **[4]**

Q11) Explain application of Geo Informatics in following areas : **[16]**

a) Geotechnical Engineering.

b) Integrated Resource Development and Management.

OR

Q12) Explain application of Geo Informatics with working flow charts in following areas:

a) Survey and Investigations. **[16]**

b) Town Planning.

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[4064]-12

B.E. (Civil)
ADVANCED CONCRETE TECHNOLOGY
(401007) (2003 Course) (Elective - II) (Sem. - II)

Time : 3 Hours]   *[Max. Marks : 100*

Instructions to the candidates:
1) *Answer any 3 questions from each section.*
2) *Answer Q.No.1 or Q.No.2, Q.No.3 or Q.No.4, Q.No.5 or Q.No.6 from Section - I & Q.No.7 or Q.No.8, Q.No.9 or Q.No.10, Q.No.11 or Q.No.12 from Section - II.*
3) *Answers to the two sections should be written in separate books.*
4) *Neat diagrams must be drawn wherever necessary.*
5) *Figures to the right indicate full marks.*
6) *Your answers will be valued as a whole.*
7) *Assume suitable data, if necessary.*

SECTION - I

Q1) a)   Explain the process hydration of cement.   **[6]**

b)   Draw and Explain the use of grading curves of aggregate.   **[6]**

c)   Explain the term   **[6]**
   •   Gel space ratio.
   •   Maturity concept for concrete.

OR

Q2) a)   Explain determination of specific surface area of cement by blain permeability apparatus method.   **[6]**

b)   Explain properties of aggregate to be used for the preparation of concrete mix.   **[6]**

c)   Explain with charts, the relation between bond strength of concrete and fineness of cement.   **[6]**

Q3) a)   Name and explain the any two types of concrete based on waste material stating their use.   **[8]**

b)   Describe gap graded concrete and no fines concrete.   **[8]**

OR

Q4) a) Explain any two types of super - plasticizers with reference to following:
   i) Their nature. **[8]**
   ii) Its effect on production of cement.
   iii) Its effect on workability.
   iv) Its dosage.

   b) Explain the following : **[8]**
   • sulphur concrete and sulphur infiltrated concrete.
   • high strength concrete, high performance concrete.

Q5) a) Design the fly ash cement concrete mix for M50 for following data using IS method. Slump - 30 to 40 mm. **[12]**
   Maximum size of aggregate 12mm and 20 mm,
   Fine aggregate - confirm to Zone - II.
   Specific gravity of OPC is 3.15 and that of aggregates is 2.7.
   Exposure - severe,
   Assume suitable data if required.

   b) Explain infra - red thermo - graphy test of non destructive test of harden concrete. **[4]**

OR

Q6) a) Design a no fine concrete mix of grade M20 by DOE method for following data. **[12]**
   Slump - 10 - 30 mm.
   Maximum size of coarse aggregate - 10mm
   Fine aggregates confirm to Zone - II
   Specific gravity of OPC - 3.15 and that aggregates - 2.7.
   Exposure - moderate, Assume suitable data if required.

   b) Explain the curing by autoclaving. **[4]**

SECTION - II

Q7) a) Explain the historical development of FRC from its inception. **[6]**
   b) Explain the tensile behavior of fibre cement composites. **[6]**
   c) Explain the major parameter and its effect on the fiber interaction with homogeneous uncracked matrix for axial stress and shear stress. **[6]**

Q8) a) Explain the major parameter affecting fiber interaction with homogeneous cracked matrix with axial stress and shear stress. **[6]**

b) Explain the bending behavior of fiber cement composites. **[6]**

c) Compare naturally and artificially occurring fibers in view of their availability, properties and use. **[6]**

Q9) a) Explain the behavior of SFRC and GFRC under compression, tension and flexure. **[8]**

b) Explain the materials, casting, testing and properties of GFRC and SFRC. **[8]**

OR

*Q10)*a) Explain the behavior of SIFCON material under compression, tension and flexure. **[8]**

b) Explain the techniques for toughness measurement for FRC. **[8]**

*Q11)*a) Explain the details of industrial precast concrete monoblock railway sleeper with reference to following : **[10]**

   i) A material required along with specification.

   ii) Analysis and design principals with silent feature.

   iii) Manufacturing method with flow chart.

   iv) Testing methodology required.

   v) Quality control.

b) Explain the product ferrocement with reference to following : **[6]**

   i) A material required along with specification.

   ii) Analysis and design principals.

   iii) Testing methodology required.

   iv) Quality control.

OR

*Q12)*a) Prepare a technical visit report which you have visited to industrial precast production unit with respect to   **[10]**
  i)   Material required with specification.
  ii) Analysis and design principles involved.
  iii) Manufacturing technology.
  iv) Testing method employed.

  b) Explain the construction of G+2 building using precast elements. **[6]**

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[4064]-19

B.E. (Civil)

DAMS & HYDRAULIC STRUCTURES

(401008) (2003 Course) (Sem. - II)

Time : 3 Hours]   *[Max. Marks : 100*

Instructions to the candidates:

1) *Answer any 3 questions from each section.*

2) *Answers 3 questions from Section - I and 3 questions from Section - II.*

3) *Answers to the two sections should be written in separate books.*

4) *Neat diagrams must be drawn wherever necessary.*

5) *Figures to the right indicate full marks.*

6) *Use of logarithmic tables slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.*

7) *Assume suitable data, if necessary.*

8) *Answer Q .1 or Q. 2, Q. 3 or Q .4, Q. 5 or Q .6 from Section - I & Q .7 or Q. 8, Q. 9 or Q .10, Q. 11 or Q. 12 from Section - II.*

SECTION - I

Q1) a) Explain the aspects to be taken into consideration while deciding the type of dam.   **[8]**

b) Explain :   **[8]**

i) Dam Instrumentation.

ii) Strengthening of dam.

OR

Q2) a) How do you classify dams according to :   **[9]**

i) Their use.

ii) Their materials of construction.

iii) Their hydraulic design.

b) Explain :   **[7]**

i) Problems in dam construction.

ii) Ill effects of dam construction.

Q3) a) Discuss with a neat sketch, the various zones of a dam reservoir. **[6]**

b) Explain how the earthquake forces are accounted for, in the design of a gravity dam. **[6]**

c) Explain - Step by step method of design of a gravity dam. **[6]**

OR

Q4) a) A gravity dam 61m high has upstream face vertical. The tap width is 6m and the bottom width is 66m. The downstream slope starts 7m. From the tap centre of drainage gallery is 7m from upstream face of the dam. Water is retained upto a depth of 56m above the base level calculate (Donot consider earthquake forces) **[12]**

i) Maximum vertical stress at the toe & heel of the dam.

ii) Major Principal stress at the toe & heel of the dam.

iii) Shear stress at the toe & heel of the dam.

b) Explain-Method of finding the storage capacity of reservoirs. **[6]**

Q5) a) Explain-seepage failure in an earth dam. What precautions and remedial measures would you undertake to control the seepage? **[8]**

b) Explain with sketches different types of syphon spillway. When are they preferred over the other types of spillways? **[8]**

OR

Q6) a) Determine the factor of safety of the d/s slope during steady seepage. The earth dam section was drawn to scale of 1cm = 10m & the following results were obtained, on a slip circle. **[8]**

Area of N-diagram = 20.55 sq.cm

Area of T-diagram = 10.45 sq.cm

Area of U-diagram = 5.05 sq.cm

Length of arc $\qquad$ = 12cm

Angle of internal friction of dam material = 30°

Cohesion = 16 kN/m^2

Unit weight of soil = 20 kN/m^2.

b) Write short notes on (any two) : **[8]**

i) Shaft spillway.

ii) VSBR stilling basin II.

iii) Pore pressure and its significance in design of earth dam.

SECTION - II

Q7) a)   Explain Khosla's method of independent variables. How do you apply correction for inclination of floor (slope), thickness of floor and interference of piles. **[10]**

   b)   Explain-Main functions of cross regulator. **[6]**

OR

Q8) a)   Explain the main causes of failure of hydraulic structures founded on pervious foundations what remedies would you suggest to prevent them.**[10]**

   b)   Explain-Bligh creep theory for design of weir on permeable foundation.**[6]**

Q9) a)   Design a concrete lined channel to carry a discharge of 300 cumecs at a slope of 1 in 4500. The side slope of the channel may be taken as 1:1 The valve of 'n' for lining is 0.01 Assume limiting velocity in the channel as 2m/s. **[6]**

   b)   What is meant by Regime channel. Explain kennedy's theory of regime channel. **[6]**

   c)   What is meant by Cross Drainage Work? With the help of a diagram explain level crossing and Inlets-Outlets, type of cross drainage work.**[6]**

OR

Q10) a)   Explain-comparison of Kennedy's and Lacey's theories, of design of channels and improvement over Lacey's theory. **[8]**

   b)   What is meant by canal lining? and what are its advantages? **[5]**

   c)   What are the factors which govern the type of cross drainage work. Sketch typical cross-section of a canal syphon. **[5]**

Q11) a)   Discuss the situations under which a spur is used as a river training measure. Differentiate between 'attracting' and 'repelling' spurs explaining their action in river training. **[8]**

   b)   Write a short note on underground power house and what are its advantages? **[8]**

OR

Q12) a)   Explain the use, design & construction of guide bunds. **[8]**

   b)   Distinguish between high & low head power development scheme, with the help of neat sketches. **[8]**

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P412

[4064]-20A

B.E. (Civil)

FOUNDATION ENGINEERING

(401010) (2003 Course) (Sem. - II) (Theory)

Time : 3 Hours]   *[Max. Marks : 100*

Instructions to the candidates:

1) Answers 3 questions from Section - I and 3 questions from Section - II.

2) Answers to the two sections should be written in separate books.

3) Neat diagrams must be drawn wherever necessary.

4) Figures to the right indicate full marks.

5) Assume suitable data, if necessary.

SECTION - I

Q1) a) Explain standard Penetration test. What are the various corrections applied to observed values?   **[6]**

b) Distinguish between disturbed & undisturbed samples.   **[6]**

c) What are the factors that influence the depth & number of exploratory holes.   **[6]**

OR

Q2) a) What are the objectives of soil investigation?   **[6]**

b) State various types of soil samplers. What is area ratio? State its significance.   **[6]**

c) What is meant by geophysical methods of soil exploration? Explain any one of them with neat sketch.   **[6]**

Q3) a) What is pressure bulb, discuss about it with neat sketch.   **[4]**

b) Explain with sketches spring analogy method of consolidation process.

[6]

c) Define preconsolidation pressure & explain how it is determined. **[6]**

OR

Q4) a) Enlist the causes of foundation settlement. **[4]**

b) Define the terms normal consolidation, over consolidation & under consolidation pressure in detail. **[6]**

c) In a consolidation test a fully saturated clay sample was subjected to a load of 450 kN/m^2. After 10 hours the average pore pressure was found to be 150 kN/m^2. Find out the time it will take for 50% consolidation. **[6]**

Q5) a) Write Terzaghi's Bearing capacity equation & explain all the terms in it. **[4]**

b) Explain how water table influences the bearing capacity. **[4]**

c) Explain in brief the plate load test with neat sketch & how the test results are used to find the bearing capacity of soil. **[8]**

OR

Q6) a) Explain with sketches types of bearing capacity failures. **[6]**

b) Explain the concept of floating foundation with a neat sketch. **[4]**

c) Two load tests were conducted at a site one with a 0.5m square test plate & the other with a 1.0m square test plate. For a settlement of 25mm, the loads were found to be 60 kN & 180 kN, respectively in the two tests. Determine the allowable bearing pressure of the sand & the load which a square footing, 2m × 2m, can carry with the settlement not exceeding 25 mm. **[6]**

SECTION - II

Q7) a) Explain in detail with sketches five fold classification of piles foundation. **[6]**

b) Explain with a sketch the concept of negative skin friction & state how would you determine the same in non-cohesive soil. **[6]**

c) A group of 16 piles of 50 cm diameter is arranged with a center to center spacing of 1.0m. The piles are 9m long & are embedded in soft clay with cohesion 30 kN/m^2. Bearing resistance may be neglected for the piles, Adhesion factor is 0.6. Determine the ultimate load capacity of the pile group. **[6]**

OR

Q8) a) What is caisson disease? Mention what precautions should be taken to avoid caisson disease. **[6]**

b) Explain with sketches the following difficulties met during sinking of well. (i) Sand blow (ii) Rectification of tilt. **[6]**

c) Enlist five important component parts of open caisson & explain with sketches design considerations involved in them. **[6]**

Q9) a) Compare in tabular form cantilever & anchored sheet piles on five different points. **[5]**

b) Draw in cross-section of braced excavation indicating component parts. State forces & design principles involved. **[5]**

c) Derive an expression for depth of embedment of cantilever pile by making simplified assumptions. **[6]**

OR

*Q10)*a) With reference to Black cotton soil explain : **[6]**
   i) Free swell index.
   ii) Differential free swell index.
   iii) Swelling potential.

b) Explain the construction procedure for under-reamed piles. **[6]**

c) Enlist typical characteristics of Black cotton soils & give their approximate values. **[4]**

*Q11)*Write detailed notes on any four of following with sketches.**[4 marks each]**
   a) Liquefaction.
   b) Factors affecting ground motion.
   c) Types of Earthquake.
   d) Geotextile in drains.
   e) Requirements of reinforced soil mechanism.

OR

*Q12)*Write detailed notes on any four of following with sketches if required.
   a) Hazards of mitigation. **[4 marks each]**
   b) Seismic waves.
   c) Types of Geosynthetics.
   d) Geotextiles in foundations.
   e) Geotextiles in embankment.

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P414

[4064]-22

B.E. (Mech & Mech. S/W) (Common)
DYNAMICS OF MACHINERY
(2003 Course) (402042) (Sem. - I)

Time : 3 Hours]　　　　　　　　　　　　　　　　　　*[Max. Marks : 100*

Instructions to the candidates:

1) *Answer three questions from section-I and three questions from section-II.*
2) *Neat diagrams must be drawn wherever necessary.*
3) *Figures to the right indicate full marks.*
4) *Assume suitable data, if necessary.*

SECTION - I

Q1) a) A turbine is used to propell the ship. Rotar of turbine is 5500kg and rotates at 2200 rpm. It rotates in anticlockwise direction when viewed from bow end. The radious of gyration of rotar is 400mm. Determine the gyroscopic effect.

When :

i) Ship is steering to the left in a curve of 80m radious at a speed of 39.06km/hr.

ii) The ship is pitching in SHM with how descending with maximum velocity.
Time period of pitching is 16sec and ship pitches 9º above 9º below the normal level.

iii) Ship is rolling.

iv) Find the maximum angular aceleration during pitching.　　**[10]**

b) A two wheeler taking a turn on curved path. Obtain an expression for angle of heel also state the various couples acting on the two wheeler.**[6]**

Q2) a) Explain the effect of gyroscopic couple on disc fixed at certain angle on rotating shaft.　　**[6]**

b) An aeroplane makes a complete half circle of 50m radious towards left when flying at 200km/hr. The rotating engine and the propeller of the plane have a mass 400kg with a radious of gyration of 40cm. The engine runs at 2400 rpm clockwise when viewed from the rear. Find the gyroscopic couple on the plane and state it's effect on it.

What will be the effect if the aeroplane turn to it's right instead of to the left.　　**[10]**

P.T.O.

Q3) a) Explain the balancing of V.engines. **[4]**

b) A shaft is supported between two bearings 2.0m apart and extended 0.5m beyond bearing at each end. The shaft carries three pulleys one at each end and one at the middle of it's length. The masses of end pulleys are 50kg and 25kg and their center of gravity are 20mm and 15mm respectively from the shaft axis. The center pulley has mass of 60kg and it's center of gravity is 20mm from the shaft axis. If the pulleys are arranged to give the static balance determine :

   i)   The relative angular positions of the pulleys.
   ii) The dynamic force produced on the bearings when the shaft rotates at 340 rpm. **[12]**

Q4) a) A twin cylinder V-engine having v-angle of 60° has strokes of 120mm and the connecting rods of length 240mm. The mass of raciprocating parts per cylinder is 2kg. If the crank speed is 2000 rpm.

   Determine the magnitude of the primary and secondary forces. **[10]**

b) Explain the method of balancing of several masses rotating in various different planes. **[6]**

Q5) a) Explain Rayleigh's method for finding the natural frequency of vibratory system. **[4]**

b) List the various causes of vibrations. **[2]**

c) Find the natural frequency of the system shown in the Fig. No - 01 (use equilibrium method).

Fig. no - 01
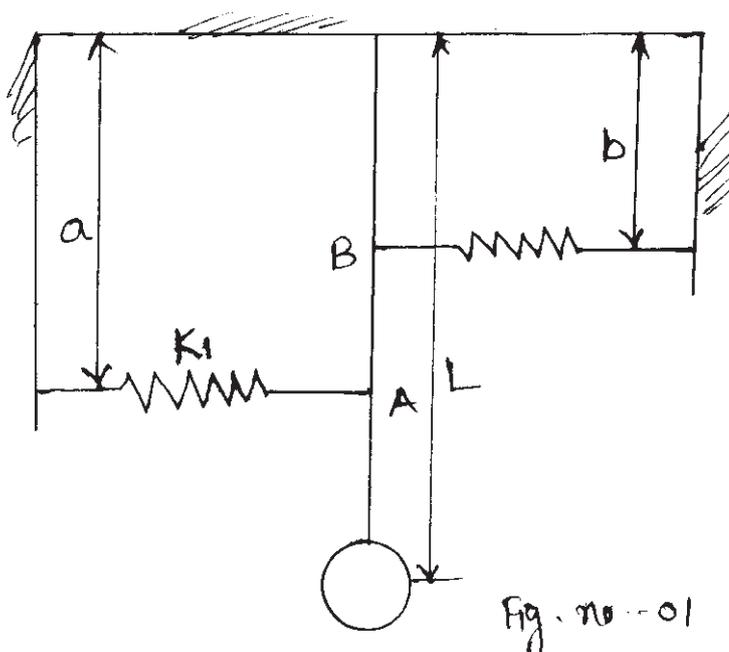
Take a = 10cm, b = 6cm, L = 20cm m = 1.5kg and k_1 = 100N/mm, k_2 = 50N/mm. If mass of the element is changed from 1.5kg to 2.5kg what will be the effect on natural frequency of the system. **[12]**

Q6) a) Explain the following terms : **[4]**
   i) Coulomb's damping.
   ii) Damping factor.
   iii) Damping coefficient.
   iv) Critical damping coefficient.

b) A disc of mass moment of inertia 0.08kg-m² is attached to end of the shaft whose diameter is 120mm and length is 600mm long. When it vibrates it is observed that the amplitudes on the same side of the rest position for the successive cycles are 9°, 6° and 4°.
   Determine :
   i) Logarithmic decrement.
   ii) Damping torque at unit velocity.
   iii) The periodic time of oscillation.
   What would be the frequency, if the disc is removed from viscous fluid.
   (Take G = 4.5 × 10¹⁰ N/m²) **[12]**

c) Define the following terms : **[2]**
   i) Natural frequency.
   ii) Resonance frequency.

SECTION - II

Q7) a) A machine part of mass 2.5kg vibrates in a viscous medium determine the damping coefficient when a harmonic exiting force of 30N results in a resonance amplitude of 12mm. with a period of 0.18 seconds. If the system is excited by a harmonic force of frequency 5 Hz what will be the percentage increase in the amplitude of forced vibration when damper is removed. **[10]**

b) Write a short note on forced vibration with raciprocating unbalance. (Draw sketch, write equation of motion) **[6]**

Q8) a) Draw and explain transmissibility versus frequency responce curves and phase angle versus frequency responce curves. **[6]**

b) A machine of 100kg mass is supported by total stifness of 700 kN/m and has an unbalanced rotating element, which results in a disturbing force of 350 N at a speed of 3000 rpm. Assuming damping factor of 0.20 determine :
   i) It's amplitude of motion due to unbalance.
   ii) The transmissibility.
   iii) The force transmitted. **[10]**

Q9) a) A shaft shown in the Fig.No - 02 carries two rotars 'A' and 'B' the mass of 'A' is 300kg with radious of gyration of 0.75m and the mass of 'B' is 500kg with radious of 0.9m.
Determine the natural frequency of the torsional vibrations. It is desired to have the node at the mid-section of the shaft of 120mm. Diameter by changing the diameter of the section having a 90mm diameter. Determine the new diameter for this condition.
(Take G = 84 GN/m²). **[12]**
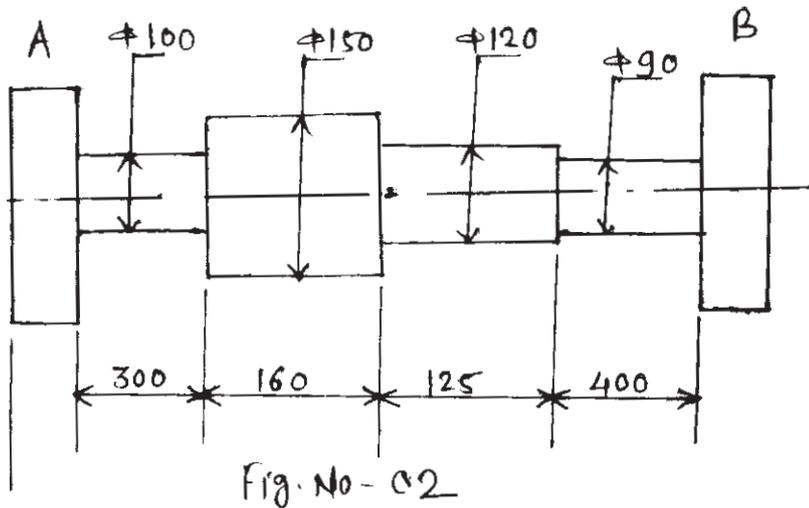
Fig. No - 02

b) Explain with sketch Lanchester Damper. **[4]**

Q10) a) Determine the natural frequency of the system as shown in the Fig.No - 03, derive the equation used.
If k_1 = 40 × 10³ N/m, k_2 = 50 × 10³ N/m, k_3 = 60 × 10³ N/m, m_1 = 10kg, m_2 = 12kg r_1 = 0.10m, r_2 = 0.11m. **[14]**

Fig. no. 03
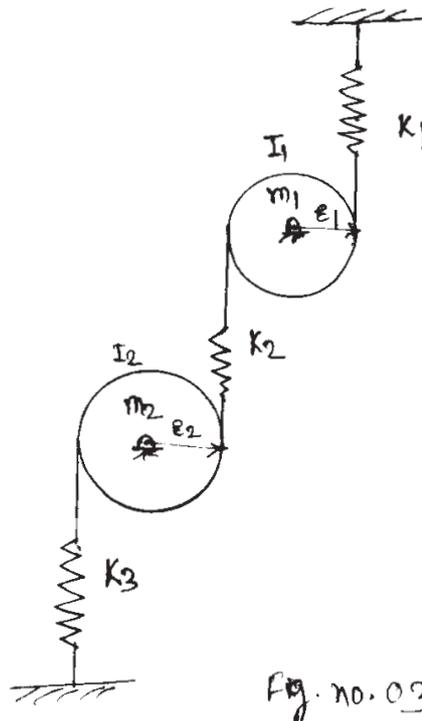
b) List the various methods of determining the natural frequency of the systems. **[2]**

Q11) a) Explain the working principle of velocity pickup and acelerometer. **[4]**

b) Write short note on Frahm's Tachometer and stroboscope. **[6]**

c) A rotar having a mass of 6kg is mounted mid-way on a simply supported shaft of diameter 10mm and length 400mm. The c.g. of the rotar is 0.02mm away from geometric center of the rotar. If the rotar rotates at 2500 rpm. Find the amplitude of steady state vibrations. (Take E = 200 Gpa) **[8]**

Q12) a) What is condition monitoring? What are the various techniques used for condition monitoring of machine tool. **[6]**

b) A shaft of 40mm diameter and 3m length has a mass of 12kg per meter length. It is simply supported at the ends and carries two masses 50kg and 60kg at 1m and 2m respectively from the left support.
Find the natural frequency of transverse vibrations.
(Take E = 200 Gpa) **[6]**

c) A vibro meter consist of a sesmic mass of 1kg. spring of stiffness 50N/m and damping factor of 0.7. The amplitude of displacement shown on vibrometer scale is 10mm. If the vibrometer is mounted on a machine vibrating at 30 rod/sec, determine the amplitude of vibration of a machine. **[6]**

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P415

[4064]-23
B.E. (Mechanical)
MECHATRONICS
(402043) (2003 Course) (Sem. - I)

Time : 3 Hours]   *[Max. Marks : 100*

Instructions to the candidates:

1) *Answer 3 questions from Section - I and 3 questions from Section - II.*

2) *Answers to the two sections should be written in separate books.*

3) *Neat diagrams must be drawn wherever necessary.*

4) *Use of logarithmic tables slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.*

5) *Assume suitable data, if necessary.*

SECTION - I

Q1) a) Explain the various elements of Mechatronics system with a suitable example. **[5]**

b) Distinguish between the following : **[6]**

i) Threshold and Resolution.

ii) Sensitivity drift and zero drift.

c) Explain with a neat sketch the working principle of Mcleod gauge.**[5]**

OR

Q2) a) Explain the various elements of Measurement system with a suitable example. **[5]**

b) State the advantages and limitations of Rotameter. **[5]**

c) Write a short note on : **[6]**

i) Dead band.

ii) Hysteresis.

Q3) a) Distinguish between total radiation pyrometer and optical pyrometer.**[6]**

b) State the advantages and limitations of thermocouple. **[5]**

c) Explain the various types of strain gauges with a neat sketches. **[5]**

P.T.O.

<p style="text-align:center">OR</p>

Q4) a) What is a load cell? Draw a neat sketch of strain gauge load cell and explain the principle of operation. **[5]**

b) Explain the typical LVDT specifications. **[5]**

c) Explain with a neat sketch the optical encoders used for measuring translatory motion. **[6]**

Q5) a) Derive the equation describing how the temperature indicated by the thermometer will vary with time when the thermometer is inserted into a hot liquid. **[6]**

b) Distinguish between open loop control system and closed loop control system with suitable example. **[6]**

c) Explain the building blocks of fluid system. **[6]**

<p style="text-align:center">OR</p>

Q6) a) Derive the mathematical model for a machine mounted on the ground. **[6]**

b) Explain the building blocks of electrical system. **[6]**

c) Write a short note on : **[6]**
   i) Transfer function.
   ii) Feed forward control system.

<p style="text-align:center">**SECTION - II**</p>

Q7) a) Explain dynamic response of second order systems to ramp input. **[6]**

b) Distinguish between on-off control and PID control. **[5]**

c) Explain level and temperature switches. **[5]**

<p style="text-align:center">OR</p>

Q8) a) Explain the dynamic response of first order system to impulse input. **[5]**

b) Write a short note on : **[6]**
   i) Bode plot.
   ii) Stability of systems.

c) Explain various control system components. **[5]**

Q9) a) Explain the various terms related to A/D converter : **[6]**
    i)   Conversion time.
    ii) Resolution.
    iii) Linearity error.

   b) Discuss the characteristics of operational amplifier. **[4]**

   c) Write a short note on : **[6]**
    i)   Schmitt trigger.
    ii) Decade counter.

<div align="center">OR</div>

*Q10)*a) Explain the various terms related to D/A converter : **[8]**
    i)   Full scale output.
    ii) Resolution.
    iii) Settling time.
    iv) Linearity.

   b) Explain integrator and differentiator operational amplifier. **[8]**

*Q11)*a) Compare relay logic control and PLC. **[6]**
   b) Explain the structure of PLC. **[6]**
   c) Write a ladder diagram for the following logic function : **[6]**
    i)   AND   ii)   NOR   iii) OR

<div align="center">OR</div>

*Q12)*a) Explain with a neat diagram the elements of microcontroller. **[6]**
   b) State the typical specifications of PLC. **[6]**
   c) Develop a ladder diagram for the following. An electric motor is started by a START switch which is NO, and stopped by a STOP switch which is NC. A selector switch is used to select either clockwise or anticlockwise rotation of the motor. The motor stops 25 seconds after the STOP switch is pressed. An extra emergency STOP switch is also provided. **[6]**

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[4064]-25

B.E. (Mechanical)

PRODUCT DESIGN AND DEVELOPMENT

(402045) (2003 Course) (Elective - I) (Sem. - I)

Time : 3 Hours]   *[Max. Marks : 100*

Instructions to the candidates:

1) Answers to the two sections should be written in separate books.

2) Neat diagrams must be drawn wherever necessary.

3) Figures to the right indicate full marks.

4) Use of logarithmic tables, slide rule, and electronic pocket calculator is allowed.

5) Assume suitable data, if necessary.

6) All questions are compulsory.

SECTION - I

Q1) a) Describe product development versus design.   **[6]**

b) Explain various types of design.   **[6]**

c) Explain the "concept of product development teams".   **[6]**

OR

Q2) a) Explain the various activities involved in a typical product development process.   **[10]**

b) "A greater breadth of concepts may be generated in product design using functional modelling". Explain.   **[8]**

Q3) a) Write down & explain the various steps involved in product teardown process.   **[8]**

b) What do you understand by product benchmarking? Explain the various steps involved in benchmarking approach.   **[8]**

OR

P.T.O.

Q4) a) Explain the various steps involved in subtract and operate procedure (SOP). **[8]**

b) Explain the different types of portfolio architectures used in product design. **[8]**

Q5) a) Explain the various methods used in 'Information Gathering' which is required for product design and development. **[8]**

b) Explain the various steps involved in a concept selection process. **[8]**

OR

Q6) a) Differentiate between informal and formal models. **[8]**

b) Explain the general process of product embodiment. **[8]**

SECTION - II

Q7) a) Explain the various guidelines used in Design For Assembly (DFA). **[10]**

b) Describe the various steps involved in production cost analysis break down. **[8]**

OR

Q8) a) Describe the various environmental objectives used in Design for Environment (DFE). **[10]**

b) Explain the various techniques to reduce the environmental impact. **[8]**

Q9) a) Explain the various fundamental concepts used in optimization. **[8]**

b) Write short notes on : **[8]**

   i)   Sensitivity Analysis.

   ii) Global Optimality.

OR

Q10) a) Explain the spread sheet search method used to explore and solve product model. **[8]**

b) Write short notes on : **[8]**

   i)   Numerical search.

   ii) Stopping criteria.

*Q11)*a) Explain uses of prototypes. **[8]**

   b) Explain Rapid Prototyping Techniques. **[8]**

OR

*Q12)*Write short notes on <u>any two</u> of the following : **[16]**

   a) Design of Experiments.

   b) Statistical Analysis of Experiments.

   c) Robust Design model construction.

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P418

[4064]-27

B.E. (Mechanical)
ALTERNATIVE ENERGY SOURCES
(402045) (2003 Course) (Elective - I) (Sem. - I)

Time : 3 Hours]   *[Max. Marks : 100*

Instructions to the candidates:

1) Answer 3 questions from Section - I and 3 questions from Section - II.
2) Answers to the two sections should be written in separate books.
3) Neat diagrams must be drawn wherever necessary.
4) Figures to the right indicate full marks.
5) Use of logarithmic tables slide rule, Mollier charts, electronic pocket calculator is allowed.

SECTION - I

Q1) a)   Write a note on sunshinerecorder.   **[4]**

b)   What are the different thermal applications of solar energy. Explain space heating system of liquid flat plate collector.   **[6]**

c)   Determine the local solar time and declination at a location latitude 23°15'N, longitude 77°30'E at 12.30 IST on June 19. Equation of time correction is given from standard table = – (1'01").   **[8]**

OR

Q2) a)   Explain the following terms   **[10]**

i)   Zenith angle

ii)   Declination.

iii)   Surface Azimuth angle.

iv)   Hour angle.

v)   Global and diffused radiation.

b)   Calculate the angle made by beam radiation with the normal to a flat collector on December 1, at 9.00 A.m, solar time for a location at 28°35'N. The collector is tilted at an angle of latitude plus 10° with the horizontal and is pointing due south.   **[8]**

P.T.O.

Q3) a) Explain the effects of following parameters on performance of liquid flat plate collector. **[10]**

      i)   Selective surface.

      ii)   Number of covers.

      iii)   Collector tilt.

      iv)   Fluid inlet temperature.

      v)   Incident solar flux.

  b) Differentiate between active and passive space heating systems of solar energy. **[6]**

<div align="center">OR</div>

Q4) a) Explain the construction of liquid flat plate collector. **[4]**

  b) Explain the following terms **[6]**

      i)   Heat loss coefficients.

      ii)   Heat Removal factor.

      iii)   Stagnation temperature of collector.

  c) Explain testing procedure for liquid flat plate collector. **[6]**

Q5) a) What are the types of solar concentrators? Explain with sketches. **[10]**

  b) Write a note on solar still. **[6]**

<div align="center">OR</div>

Q6) a) What is the concentration ratio of solar concentrator. What are the typical values of concentration Ratio for different solar concentrator. **[4]**

  b) Explain central receiver collector system with schematic sketch. **[6]**

  c) Write a note on 'solar pond'. **[6]**

<div align="center">

SECTION - II

</div>

Q7) a) Describe the single crystal silicon cell. Also explain principle of working of a solar cell. **[8]**

  b) Describe the various types of wind machine rotors and also draw variation of power coefficient with tip speed ratio for various rotors. **[10]**

<div align="center">OR</div>

Q8) a) Draw current-voltage characteristic of a solar cell and also explain. **[4]**

b) Solar-pumping system has the specifications as follow **[8]**

Bore well depth = 48m

Modules = 24

Invertor efficiency = 85%

Pump-motor set efficiency = 45%

Global normal radiation = 945 W/m²

Solar cell efficiency = 12.8%

Module size = 100 × 50 cm

Cell size = 10.4 × 10.4 cm

Number of cells per module = 36

Density of water = 996 kg/m³

Calculate water discharge rate in litres/hour.

c) Explain the following terms : **[6]**

i) Power coefficient.

ii) Tip speed ratio.

iii) Cut-in and cut-out speed of wind machine.

Q9) a) Explain different types of geothermal resources. **[8]**

b) What are selection parameters of site for tidal energy power plant. **[8]**

OR

*Q10)*a) Explain the potential of ocean thermal energy in India. Also differentiate between closed and open cycle system of ocean thermal energy conversion. **[8]**

b) What are different types of fuel cells. Explain working principle of Hydrogen-oxygen fuel cell. **[8]**

*Q11)*a) List the various methods for obtaining energy from bio-mass classify the biomass gasifiers and also write the chemical reactions occured in downdraft gasifier. **[10]**

b) What are advantages and disadvantages of biogas plants? **[6]**

<div align="center">OR</div>

*Q12)*a) What are the considerations of design of digester of bio-gas plant. **[4]**

b) Explain working principle of biogas plant with sketch. **[4]**

c) Write a note on ISO14000 and 16000. **[8]**

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P423

[4064]-35

B.E. (Mechanical Engineering)
COMPUTATIONAL FLUID DYNAMICS
(402050) (2003 Course) (Elective - II) (Sem. - II)

Time : 3 Hours]   *[Max. Marks : 100*

Instructions to the candidates:
   1)   Assume suitable data if required.
   2)   Figures to right indicate full marks.
   3)   Use of calculator is allowed.

SECTION - I

Q1) a)   Derive the continuity equation in differential form for incompressible flow.   **[12]**

   b)   Explain-Dirichlet boundary conditions and Neumann boundary conditions.   **[6]**

OR

Q2) a)   Explain the physical significance of substantial derivative, local and convective derivatives and obtain the relation among them.   **[12]**

   b)   Explain stability and consistency of the solution.   **[6]**

Q3) List the procedure for solving of Blasius equation using Shooting method.   **[16]**

OR

Q4) a)   Outline the procedure for solving the tridiagonal system $Ax = b$ using an example of a physical system. Assume 4×4 matrix for A.   **[12]**

   b)   Explain explicit and implicit schemes for solving PDEs.   **[4]**

Q5) Derive the unsteady mass conservation equation in differential form for 1D compressible flow in convergent divergent nozzle. Also show the density is updated using Mac Cormack method.   **[16]**

OR

Q6) Consider one-dimensional transient conduction equation :   **[16]**

   a)   Write the expression for explicit method. Derive the stability criteria.

   b)   Present implicit algorithm. What is stability criterion.

SECTION - II

Q7) A liquid metal at temperature T_∞ flows at a velocity u_∞ over a flat plate of length L in the flow direction. The plate temperature is uniform at T_s $(T_s < T_\infty)$. Formulate the problem by finite difference method so that you can calculate the average heat flux to the plate. Is any analytical solution available for this problem.   **[18]**

OR

Q8) A steel plate of thickness 50 mm is initially at 500°C. It is suddenly plunged into cold water. As a result of this, the surface temperature drops to 70°C and remains to this value for the rest of the cooling process. Estimate the time elapsed for the midplane temperature to cool down to 300°C using Crank-Nicholson method.   **[18]**

Q9) Outline the MAC algorithm for fluid flow solution.   **[16]**

OR

*Q10)*a)   Explain the Finite Volume Method.   **[12]**

   b)   Write Navier-Stokes equation for incompressible flows.   **[4]**

*Q11)*For linear wave equation, $u_t = a\ u_x$ **[16]**

   a)   Outline the Lax-Wendroff method to solve this equation.

   b)   What is the order of accuracy?

   c)   What is stability criteria?

OR

*Q12)*a)   Explain the Semi-Implicit Method for Pressure-Linked Equations.**[12]**

   b)   Explain the physical meaning of divergence of velocity.   **[4]**

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P424

[4064]-37

B.E. (Mechanical Engineering)
RAPID PROTOTYPING
(402050) (2003 Course) (Elective - II) (Sem. - II)

Time : 3 Hours]   *[Max. Marks : 100*

Instructions to the candidates:

1) *Solve any three questions from each section.*
2) *Answers to the two sections should be written in separate answer books.*
3) *Figures to right indicates full marks.*
4) *Neat diagram should be drawn wherever necessary.*
5) *Assume suitable data, if necessary.*

SECTION - I

Q1) a) What is the impact of the current technologies, such as CAD-CAM, rapid prototyping and Virtual prototyping on product prototyping?**[6]**

b) What are the requirements of New Product Development Strategies?**[6]**

c) State the reasons for the failure of a new product? **[4]**

Q2) a) How RP technology has been revolutionizing the manufacturing industry? Discuss in detail with examples. **[8]**

b) Explain typical data flow in RP with flow-chart and state various data inputs. **[8]**

Q3) a) Explain how can bringing a product to market rapidly have an impact on the rate of return. Explain with a example how it affects the outcome of other competitive products. **[8]**

b) Classify RP systems on the basis of initial material form and list five names of each and discuss their merits and demerits. **[8]**

Q4) a) Explain with neat sketch SLS process in detail along with its merits and demerits. Further compare the SLS with Stereolithography. **[8]**

b) Explain with neat sketch SGC process, its applications and limitations.

[8]

P.T.O.

Q5) Write short notes (any three) :   **[18]**
   a)   MJM.   b)   STL and SLC file Format.
   c)   Simultaneous Engineering.   d)   Model Classes.
   e)   LOM.

SECTION - II

Q6) a)   What are different types of Polymers? Justify Polymer categories and
          chain structure for assigning a material for: **[8]**
          i)   Tooling dies.   ii)   Beverage containers.   iii)   Helmet.
      b)   Which method to select among solid, liquid and powder based RP
          processes for a particular application? Explain with suitable example.**[8]**

Q7) a)   Explain in details types of model makers materials with physical,
          mechanical, thermal and electrical properties.   **[8]**
      b)   How do various RP technologies use liquid to build a part? How difficult it
          would be to maintain the thickness and porosity of the deposited layer?**[4]**
      c)   Explain with sketch stair steeping effect.   **[4]**

Q8) a)   Name four areas of RP applications in medical field and briefly describe
          how RP technology is improving each area?   **[8]**
      b)   Explain and differentiate Single Component and Multi Component
          Metal Powder Laser Sintering processes.   **[8]**

Q9) a)   Explain criteria for evaluating a type of RP process with a case study.**[8]**
      b)   What are the important factors influencing the cost of RP process?
          Elaborate with suitable example.   **[8]**

*Q10)*Write short notes (any three) :   **[18]**
   a)   Future trends in RP Processes.
   b)   RP, CNC. & Conventional manufacturing.
   c)   RT.
   d)   Make or By decision in RP.
   e)   Metal Spraying.

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P426

[4064]-39

B.E. (Mechanical)

AUTOMOBILE ENGINEERING

(402050) (2003 Course) (Elective - II) (Sem. - II)

Time : 3 Hours] [*Max. Marks : 100*

Instructions to the candidates:

   1) *Answer Q.No.1 or Q.No.2, Q.No.3 or Q.No.4, Q.No.5 or Q.No.6 questions from Section - I & Q.No.7 or Q.No.8, Q.No.9 or Q.No.10, Q.No.11 or Q.No.12 questions from Section - II.*

   2) *Answers to the two sections should be written in separate books.*

   3) *Neat diagrams must be drawn wherever necessary.*

   4) *Figures to the right indicate full marks.*

   5) *Use of electronic pocket calculator is allowed.*

   6) *Assume suitable data, if necessary.*

SECTION - I

Q1) a) What alternative positions may the engine occupy in a vehicle? State why it is fitted at the front on majority of vehicles. **[8]**

   b) Explain characteristics and advantages of diaphragm spring over the coil springs for applications in automobile clutch. **[8]**

OR

Q2) a) What is the function of car frame? Sketch and describe the construction of a typical passenger car frame. **[8]**

   b) Explain the working of multi-disc type wet clutch with the help of a sketch. What are its advantages over single plate dry disc type of clutch?**[8]**

Q3) a) Discuss the merits and demerits of synchromesh gear box over sliding mesh gear box. **[8]**

   b) Explain the following terms **[8]**
   Total vehicle resistance.
   Draw bar pull
   Tractive effort.

OR

P.T.O.

Q4) a)　Find the power of passenger car of weight 15 kN including four passengers and luggage. Engine is running in top gear at 5500 rev/min, size of wheel tyre is 0.5 m. Crown wheel to pinion ratio is 4.3. Frontal area of body is 2.0 m². Take coefficient of rolling and air resistance as 0.015 and 0.045 N/m²/kmph² respectively. **[10]**

　　b)　Write short note on automatic transmission. **[6]**

Q5) a)　What are the objectives of suspension system? What are the advantages of independent suspension system? **[8]**

　　b)　Describe the purpose and operation of automatic level control and air suspension. **[10]**

<div align="center">OR</div>

Q6) a)　Explain following terms in relation to the riding comfort in an automobile : **[8]**

Pitching

Rolling

Bouncing

Yawing

　　b)　Write short note on any two : **[10]**

Torsion bar suspension.

Hydro-pneumatic suspension.

Hydraulic shock absorber.

<div align="center">

SECTION - II

</div>

Q7) a)　Explain with the help of neat sketches the following terms **[8]**

Caster

Camber

King pin inclination

Scrub radius

　　b)　What are the advantages of tubeless tyres? **[4]**

　　c)　What are the requirements of good steering system? **[4]**

<div align="center">OR</div>

Q8) a) What do you understand by the terms? **[6]**
Over-steering
Under-steering
Cornering power
Slip angle

b) What are the advantages of power steering? Explain construction and operation of power steering with the help of neat sketch. **[7]**

c) Discuss cross ply and radial ply tyres. **[3]**

Q9) a) Compare torque tube drive and Hotchkiss drive in detail with neat sketches. **[8]**

b) What is a non slip differential or differential lock? Describe its operation. **[4]**

c) Give merit and demerits of semi floating axle, three quarter floating axle and full floating axle. **[6]**

OR

Q10) Write short note on any three : **[18]**
Final drive.
Constant velocity joint.
Differential.
Propeller shaft.

Q11) a) Describe construction and working of anti lock brake system. **[6]**
b) Explain with the help of neat sketch folo thru Bendix drive. **[6]**
c) Discuss in detail trouble shooting of any one of following system **[4]**
Steering system
Braking system.

OR

Q12) a) What are the advantages of disc brake over drum brake? **[4]**
b) Write note on engine exhaust brake. **[6]**
c) Write note on dash board instruments. **[6]**

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P427

[4064]-50B
B.E. (Mech. S/W)
NON-CONVENTIONAL ENERGY SOURCES
(402065) (2003 Course) (Sem. - II) (Elective - II)

Time : 3 Hours]   *[Max. Marks : 100*

Instructions to the candidates:

1) Answer three questions from section - I and three questions from section - II.
2) Answers to the two sections should be written in separate books.
3) Neat diagrams must be drawn wherever necessary.
4) Figures to the right indicate full marks.
5) Use of logarithmic tables, slide rule, Mollier chart, electronic pocket calculator and   steam tables is allowed.

SECTION - I

Q1) a) Discuss the applications of solar energy and advantages and limitation of solar energy. **[8]**

b) Define Beam & Diffuse radiation. What is Local Apparent Time and why it is different than standard time observed on a clock. Give the equation for Local Apparent Time. **[9]**

OR

Q2) a) Define Solar constant, Declination angle, Solar azimuth angle, Hour angle. Calculate the angle made by beam radiation with the normal to a flat-plate collector on December 1 at 0900 h (local apparent time). The collector is located in New Delhi (28°35'N, 77°12'E), and is tilted at an angle of 36° with the horizontal and is pointing due south. **[9]**

b) Explain the working of Pyranometer with neat sketch. **[8]**

Q3) Explain the working of conventional liquid flat plate collector with neat sketch. Give the energy balance for the absorber plate and define the instantaneous collector efficiency. Explain briefly top loss coefficient, bottom loss coefficient, side loss coefficient. **[17]**

OR

Q4) a) Discuss in brief the applications of solar air heating. **[6]**

b) What is the effect of selective surfaces and number of covers on performance of flat plate collectors? **[4]**

c) Why collector heat removal factor important in the model for flat plate collector? **[7]**

Q5) a) Write the limitations of flat plate collectors and advantages of concentrating solar collectors. State the different types of concentrator used. **[8]**

b) Explain the working of solar pond and effect of various parameters on its performance. **[8]**

OR

Q6) Write short notes on : **[16]**

a) Solar distillation system.

b) Parabolic Trough Concentrator.

c) Materials for concentrators and reflecting surfaces.

d) Solar tower system.

SECTION - II

Q7) What kinds of materials are being used for manufacturing photovoltaic cell? Which kind of photovoltaic cells are most commonly used? Explain the application of each of the above type of photovoltaic cells. **[16]**

OR

Q8) As a engineer, you have been assigned to set up a wind power plant. Enlist and explain various steps which will ensure timely installation and actual power generation from your plant. **[16]**

Q9) a) Discuss the status of tidal energy utilization in India. **[8]**

b) Explain the working of fuel cell. **[8]**

*Q10)*a) Give suitable locations for geothermal power plant in India. What are the limitations of geothermal power plant. **[8]**

b) Explain with a schematic diagram the principles of closed cycle OTEC. What are its advantages? **[8]**

*Q11)*a) Discuss the factors affecting the Biogas production. **[9]**

b) Explain the downdraft wood gasifier with a neat sketch. Also write the reactions occurring in each zone. **[9]**

*Q12)*a) Discuss the emission from renewable fuels. **[9]**

b) What are the different methods of obtaining energy from biomass? What is an energy plantation? **[9]**

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P428

[4064]-51

B.E. (Production)
PRODUCTION MANAGEMENT
(411081) (2003 Course) (Sem. - I)

Time : 3 Hours] *[Max. Marks : 100*

Instructions to the candidates:

1) Answer three questions form Section - I and three questions form Section - II.
2) Answers to the two sections should be written in separate books.
3) Neat diagrams must be drawn wherever necessary.
4) Figures to the right indicate full marks.
5) Use of logarithmic tables, slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.
6) Assume suitable data, if necessary.

SECTION - I
Unit - I

Q1) a) Explain the relationship of product design & product cost. **[6]**

b) Explain the concept of Concurrent Engineering. **[6]**

c) Draw a functional organisation structure for a multi-product organisation for a medium size business. **[4]**

OR

Q2) a) How does the Break Even Analysis help in product design & development? **[8]**

b) What are the duties of production manager in modern manufacturing industry? What is the need of new product design? **[8]**

Unit - II

Q3) a) Enumerate 20 principles of material handling and explain at least six principles of material handling. **[9]**

b) Compare the urban & suburban locations with their advantages and disadvantages. **[9]**

OR

P.T.O.

Q4) a) What are the symptoms of bad material handling. **[6]**

b) Define plant layout and explain the situations when it is required in the industry. **[6]**

c) There are 6 existing plants, which have a material relationship with a new plant. The existing plants have locations of (200, 300), (400, 700), (900, 600), (800, 100), (300, 650) and (1000, 400). The number of tons of material transported per year from the new plant to various existing plants are 400, 800, 300, 900, 700 and 1400 respectively. Determine the optimum location for the new plant such that the distance moved (cost) in transporting the material to the existing facilities is minimized. Use centre of gravity method for calculation. **[6]**

Unit - III

Q5) a) Explain in brief skills inventories of present employees. **[8]**

b) What are the different manpower forecasting techniques? Explain any two in brief. **[8]**

OR

Q6) a) "The major responsibilities in a productivity drive are to : **[8]**
i) Identify the objectives.
ii) Set up a productivity improvement programme (PIP) and
iii) Establish a productivity measurement system Explain this in brief.

b) Explain partial productivity measures and total productivity measures with their advantages & disadvantages. **[8]**

SECTION - II
Unit - IV

Q7) a) Write in brief "World Class Manufacturing The Indian Scenario" **[8]**

b) Explain in brief the evolution of world class manufacturing. **[5]**

c) Information age competition has initiated some unique challenges that business have to cope up with (by Luftman 1996). These are described below : i) Managing uncertainty. **[5]**
ii) Understanding consumer.
iii) Understanding globalization of the business.

OR

Q8) a) What are the first principles of WCM? Explain in brief. **[9]**

b) Explain the operation assumptions given by kaplan and Norton (1996) in order to compute in the information age. **[9]**

Unit - V

Q9) a) Explain the difference between preventive maintenance and breakdown maintenance. **[8]**

b) What are the factors considered while preparing maintenance schedule? **[8]**

OR

*Q10)*a) What are the 8 pillars of TPM? Explain 5S and Jishu Hozen (Autonomous maintenance). **[8]**

b) What are the techniques used to estimate the labour costs in maintenance department? **[8]**

Unit - VI

*Q11)*a) One of the solution to minimize the environmental changes is cleaner production technologies as given below : **[8]**
   i)   Productivity increases in resource utilization.
   ii)   Multi uses of resources.
   iii) Non waste technology.
   iv)   Recycling.
   v)   Material substitution (value engineering).
   vi)   Alteration of end product itself (Product Design).
   vii) Technology Eco system.
         Explain these in brief

b) Explain Agile manufacturing in brief. **[8]**

OR

*Q12)*a) Explain "Computerized Management System" in brief. **[8]**

b) What is the difference between conventional manufacturing (production) and green manufacturing (production). **[8]**

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P429

[4064]-52

B.E. (Production / Production S/W)
MACHINE TOOL DESIGN
(411082) (2003 Course) (Sem. - I)

Time : 3 Hours]   *[Max. Marks : 100*

Instructions to the candidates:

   1)   *Attempt one question of each unit from Section - I and Section - II.*

   2)   *Answers to the questions should be written on separate books.*

   3)   *Draw neat diagram wherever necessary.*

   4)   *Assume suitable data, if required.*

SECTION - I
Unit - I

Q1) a)   Design a gear box for six spindle speeds of $\phi = 1.41$ series, with maximum spindle speed as 1420 rpm. Draw the best possible structural diagram, ray diagram, speed chart and gear layout. **[14]**

     b)   Discuss the considerations of variator design. **[6]**

OR

Q2) Write a short note on the following : **[20]**

     a)   PIV Drive,

     b)   Feed gear box with Meander's mechanism,

     c)   Sliding key gear box.

     d)   Design consideration in machine tool feed gear box.

Unit - II

Q3) a)   What are the desirable properties of materials used for making machine tool structure? State the materials commonly used. **[7]**

     b)   Explain the effect of aperture or opening of the walls on static and dynamic stiffness of the box type structure. **[8]**

OR

Q4) a) Sketch the commonly used column sections and state their applications. State the optimum design considerations for the column of machine tool. **[8]**

b) Sketch the commonly used bed sections. What are the functions of bed in machine tools? **[7]**

Unit - III

Q5) a) Explain why two sets of guideways are provided for lathe bed. Explain any one method of clearance adjustment for slide. **[8]**

b) Sketch, describe and compare the commonly used thread profiles for sliding friction power screws. **[7]**

OR

Q6) a) What are the major requirements of guideways suitable for machine tools? Give the classification of guides and slideways used in machine tools. **[7]**

b) State and explain the important design considerations for power screw. **[8]**

SECTION - II
Unit - IV

Q7) a) State the functions of spindle units if machine tools. What are the desirable features of spindle supports? **[8]**

b) Explain with neat sketch the spindle unit for lathe and drilling machine tool. **[8]**

c) What are the recommendations for selection of material for spindle of a machine tool. **[4]**

OR

Q8) a) Describe the various elements of a spindle unit used in a lathe machine. Draw the neat sketch of the arrangement. **[7]**

b) Discuss the importance of the following in spindle design. **[8]**
   i) Spindle material,
   ii) Additional spindle support,
   iii) Location of bearings and drive elements,
   iv) Balancing.

c) Find out an expression for maximum load on a each ball in antifriction bearing. **[5]**

Q9) a) What is the effect of vibration on machine tool, cutting condition, work piece, tool life. **[8]**

b) With a neat sketch of the control circuit, explain the method of obtaining electrical braking to reduce the inertia during stopping the motor. **[7]**

OR

*Q10)*a) What do you understand by self-excited vibration in machine tool and state the methods of preventing it? **[8]**

b) What is adaptive control? How is it used in modern machine tool?**[7]**

Unit - VI

*Q11)*Write a short note on following : **[15]**

a) Important characteristics of NC machine tool.

b) Design consideration SPM.

c) Unit head machine tool.

OR

*Q12)*a) Explain how and where a retrofitting is done in a old milling machine tool. **[8]**

b) Explain tooling requirements in CNC machine tool. **[7]**

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P430

[4064]-53
B.E. (Production/Production S/W)
MANUFACTURING AUTOMATION AND CONTROL
(411083) (2003 Course) (Sem. - I)

Time : 3 Hours]   *[Max. Marks : 100*

Instructions to the candidates:

1) Answer any three questions from each section.
2) Answers to the two sections should be written in separate books.
3) Neat diagrams must be drawn wherever necessary.
4) Figures to the right indicate full marks.
5) Use of logarithmic tables slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.
6) Assume suitable data, if necessary.

SECTION - I

Q1) a) List any six applications where fluid power can be used more effectively than any other power source. Justify your answer.   **[6]**

   b) Draw a neat sketch of a pressure compensated flow control valve and explain its working.   **[6]**

   c) Explain with neat sketch the working of 4/3 direction control valve.**[6]**

OR

Q2) a) A mass of 25000N is to be accelerated from rest to a velocity of 2.5 m/s over a distance of 100 mm. Calculate the bore diameter of cylinder if coefficient of friction between load and guide is 0.12.   **[6]**

   b) Explain with neat sketch the working of balanced piston pressure relief valve.   **[6]**

   c) Explain with neat sketch working of radial piston pump and derive expression for flow.   **[6]**

Q3) a) A hydraulic system requires 120 *l/min* at 20 bar pressure for 15 seconds and 40 *l/min* at 320 *bar* pressure for 25 seconds. Draw the hydraulic circuit using intensifier to satisfy the above requirement. Also calculate the size of the pump and input energy to pump.   **[10]**

   b) Explain the advantages of meter out circuit over meter in circuit. **[6]**

OR

Q4) a) A reservoir of size $0.5 \times 0.5 \times 1.2$ m is used in a hydraulic system having pump flow 25 *lpm* with input power to pump drive of 15 KW. The pump is loaded for 40% of the time and the overall efficiency when it is on is 75%. Calculate the maximum fluid temperature in the reservoir if the ambient temperature is 20°. **[10]**

b) Name four types of cylinder mountings with sketches. **[6]**

Q5) a) Draw a suitable pneumatic circuit for a driven by a single acting cylinder with actuation of at least two (of three) manually operated valves. **[8]**

b) Explain with suitable example the working of time delay valve. **[8]**

OR

Q6) a) Draw a position step diagram and design suitable circuit for a 2 cylinder pneumatic system in which the cylinders extend and retract sequentially.
[8]

b) Explain with neat sketches working of FRL unit. **[8]**

SECTION - II

Q7) a) What is microprocessor? Sketch the general architecture of microprocessor and explain the function of various parts. **[8]**

b) Draw and explain ladder diagram for a motor with the following : Normally open start button, normally closed stop button, thermal overload switch opens at high temperature, green light when running, red light for thermal overload. **[8]**

OR

Q8) a) Explain with suitable example the use of accumulating timer in PLC.
[8]

b) What are the various components of process control system? Explain the function of each component briefly. **[8]**

Q9) a) Describe and compare the characteristics of : **[8]**

      i)   Proportional control.

      ii)   Proportional plus integral control.

      iii) PID control.

    b)   What are criteria for selection of a PLC? **[8]**

<div align="center">OR</div>

*Q10)*a)   Explain with suitable example latch circuit. **[8]**

    b)   Write an assembly language program for addition of two numbers.**[8]**

*Q11)*a)   Explain various principles of material handling systems. **[8]**

    b)   Explain with neat sketch any two types of rotary feeders. **[10]**

<div align="center">OR</div>

*Q12)*Write short notes on : **[18]**

    a)   Use of oscillating disks for automated orientation of workpiece.

    b)   Handling and loading in transfer lines.

    c)   Types of escapements.

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P433

[4064]-72

B.E. (Production S/W)
MECHATRONICS & ROBOTICS
(411121) (2003 Course) (Sem. - I)

Time : 3 Hours]   *[Max. Marks : 100*

Instructions to the candidates:

1) *Answers to the two sections should be written in separate books.*

2) *Answer three questions from each section.*

3) *Neat diagrams must be drawn wherever necessary.*

4) *Assume suitable data, if necessary.*

SECTION - I

Q1) a)   With a help of neat block diagram; differentiate clearly between closed loop control system and open loop control system. State advantages and limitations of each.   **[9]**

b)   Discuss the functioning of an Engine Management System and draw a block diagram representing the basic elements of the control system for it.   **[9]**

OR

Q2) a)   State and explain the signal conditioning processes.   **[6]**

b)   Discuss the following with neat sketches :   **[12]**

i)   Inverting amplifier.

ii)   Summing amplifier.

iii) Integrating amplifier.

Q3) a)   Explain the following for a Microprocessor :   **[16]**

i)   Assembler.   ii)   Memory address.

iii) Bus.   iv)   Instruction Pointer.

OR

Q4) a) Define : **[12]**
   i) TTL.   ii) CMOS.
   iii) Digital Logic.   iv) Parity method for Error Detection.

b) How does a microcontroller differ from microprocessor? **[4]**

Q5) a) What is an Instruction set? State and explain any four commonly used instructions that may be given to a microprocessor. **[7]**

b) Write a program in assembly language to determine the maximum Temperature obtained from a list of measured temperatures. **[9]**

OR

Q6) Explain the following with neat figures : **[16]**
   a) Bidirectional Buffer.
   b) Handshaking.
   c) Polling and interrupts.
   d) Serial interfacing.

SECTION - II

Q7) a) Explain the following with the help of a ladder diagram : **[8]**
   i) Latching.
   ii) Sequencing.

b) Explain any two of the following : **[8]**
   i) Rotary Encoder.   ii) Seebeck Effect.
   iii) Potentiometers.   iv) Pneumatic Proximity Sensor.

OR

Q8) a) Draw a ladder diagram for switching ON a motor on pressing a Green switch and switching OFF after 10 seconds of pressing the Red switch.**[8]**

b) State and explain a sensor to measure the following : **[8]**
   i) Fluid Pressure.   ii) Liquid Flow.
   iii) Temperature.   iv) Displacement.

Q9) Compare Pneumatic, Hydraulic and Electrical drives for robotic applications. State the particular applications of each in Robots. **[16]**

OR

*Q10)*State and explain various types of :   **[16]**

    a)   Valve bodies and Plugs.

    b)   Ball and roller bearings.

    c)   Solid state devices.

*Q11)*a)   Define 'Robot' and explain clearly the operational features of industrial robots which make them different from fixed automation.   **[9]**

    b)   With the help of a neat diagram, explain the basic components of a typical robotic system.   **[9]**

<div align="center">OR</div>

*Q12)*Explain the following terms :   **[18]**

    a)   Work envelope.

    b)   Spatial Resolution.

    c)   Degrees of freedom.

    d)   Roll, pitch, yaw.

    e)   Compliance.

    f)   Repeatability.

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P436

[4064]-82

B.E. (Electrical)

UTILIZATION OF ELECTRICAL ENERGY

(2003 Course) (403142) (Sem. - I)

Time : 3 Hours]   *[Max. Marks : 100*

Instructions to the candidates:

1) *Answer 3 questions from Section - I and 3 questions from Section - II.*

2) *Answers to the two sections should be written in separate books.*

3) *Neat diagrams must be drawn wherever necessary.*

4) *Figures to the right indicate full marks.*

5) *Use of logarithmic tables slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.*

6) *Assume suitable data, if necessary.*

SECTION - I

Q1) a) Explain the design procedure of the heating elements when the power and voltage of the oven are known. **[8]**

b) What should be the properties of heating element material used in resistance oven? State the different types of heating materials used. **[8]**

OR

Q2) a) What are the modern welding techniques? Describe them. **[8]**

b) A plywood board $0.5 \times 0.25 \times 0.02$ metre is to be heated from 25°C to 125ºC in 10 minutes by dielectric heating employing a frequency of 30 MHz. Determine the power required in this heating process. Assume specific heat of wood 1500 J/kg/°C; weight of wood 600 kg/m³ and efficiency of process 50%. **[8]**

Q3) a) Describe the process of electro-extraction of aluminium using electrolysis. **[8]**

b) What are the different application of electrolysis? Describe anodizing in brief. **[8]**

OR

Q4) a) Define air conditioning. On what factors does the air conditioning depand explain in detail. **[8]**

b) Describe complete arrangement of centrally air comditioning plant.**[8]**

Q5) Write a short notes on : **[18]**
a) Classification of light fittings.
b) Flood lighting.
c) Mercury vapour lamp.

OR

Q6) a) Explain the factors affecting the design of indoor lighting installations.**[6]**

b) Enumerate the various factors to be considered while designing street lighting. **[6]**

c) Explain what is mean by 'point-to-point method' of lighting calculations. **[6]**

SECTION - II

Q7) a) Explain different systems of electric fraction existing in our country.**[8]**

b) Explain current collection system in electric fraction. **[8]**

OR

Q8) a) Compare the DC and AC systems of railway electrification from point of main line and sub urban line railway service. **[8]**

b) Draw a general block diagram for AC electric locomotine and explain it. **[8]**

Q9) a) Draw the speed-time curves of electric trains for **[8]**
i) Main line service and
ii) Suburban service and explain their characteristic.

b) An electric train is to have acceleration and braking retardation of 0.8 kmphps and 3.2 kmphps respectively. If the ratio of maximum to average speed is 1.3 and time for stops 26 seconds. Find schedule speed for a run of 1.5 km. Assume simplified trapezoidal speed time curve. **[8]**

OR

*Q10)*a) What is specific energy consumption of a train? Discuss various factor affecting it. **[8]**

b) An electric train has quadrilaterae speed time curve as follows. **[8]**

i) Uniform acceleration from rest at 2 kmphps for 30 seconds.

ii) Coasting for 50 seconds.

iii) Braking period of 20 seconds.

The train is moving a uniform down gradient of 1%, tractive resistance 40 N/tonne rotational inertia effect 10% of dead weight, duration of stop 15 seconds and overact efficiency of transmission gear and motor as 75%. Calculate its schedule speed and specific energy consumption of run.

*Q11)*a) What are the main advantages of series parallel control of dc series fraction motors over rheostaice method of starting and speed control? Prove that in case of six dc series motors of identical ratings efficiency is 75% when series parallel method starting is employed. **[10]**

b) What are the advantages of regenerative braking and explain how regenerative braking can be obtain in dc locomotives. **[8]**

OR

*Q12)*a) Discuss suitability of dc series motor for fraction systems. **[6]**

b) Compare shunt and bridge transition. **[6]**

c) State the mechanical and electrical features of electric fraction motors.**[6]**

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P444

[4064]-104

B.E. (Electronics)
VLSI DESIGN
(404204) (2003 Course) (Sem. - I)

Time : 3 Hours]   *[Max. Marks : 100*
Instructions to the candidates:
 1) *Answer any 3 questions from each section.*
 2) *Answers to the two sections should be written in separate books.*
 3) *Figures to the right indicate full marks.*
 4) *Assume suitable data, if necessary.*
 5) *Neat diagrams must be drawn wherever necessary.*
 6) *Use of non programmable electronic pocket calculators is allowed.*

SECTION - I

Q1) a) What is necessity of test benches? State types of test benches and Explain any one with suitable example. **[8]**

 b) Explain the various delay models in VHDL. **[8]**

OR

Q2) a) Explain the VLSI design flow. **[8]**

 b) Write sequential and concurrent VHDL descriptions, to describe a 8:1 Mux. **[8]**

Q3) a) Draw state diagram and write VHDL code for traffic light controller controlling traffic for two lane intersection. **[10]**

 b) What are the effects of synchronous clock on power dissipation, noise in FSM with examples. **[8]**

OR

Q4) a) Write the VHDL code for LIFT Controller for a three storied building. **[10]**

 b) What is metastability? State the solutions. Explain any one solution in detail. **[8]**

P.T.O.

Q5) a) What size lookup table (LUT) is required, if we want to implement two independent logic functions of 5 variables? **[2]**

b) When implementing an 4 bit counter in an FPGA How many CLBs are required? **[2]**

c) Explain (with diagram) how is a full adder can be implemented in an FPGA. **[4]**

d) What are the merits of FPGA/CPLD over other logic implementing devices? **[8]**

OR

Q6) a) What are the advantages of a monolithic SRAM block over a SRAM built from LUTs in FPGA? **[4]**

b) Explain the functions of PLL, DLL on an FPGA. **[4]**

c) What is the difference between CPLD and FPGA? **[8]**

SECTION - II

Q7) a) Explain the H Tree and Balanced tree clock distribution. **[8]**

b) Explain the parasitics involved in routing matrix. How to achieve EMI immune design? **[8]**

OR

Q8) a) Explain SRC and DRC. **[8]**

b) Explain power distribution and how to achieve power optimization? **[8]**

Q9) a) Explain the working of CMOS Inverter. **[8]**

b) Explain the significance of pull up and pull down blocks in a CMOS inverter. **[4]**

c) Draw 3 input CMOS NOR gate. Evaluate the sizing of transistors? **[6]**

OR

Q10) a) If all transistors were of the same size in a gate, how would it affect the performance? **[4]**

b) Draw 3 input CMOS NAND gate. Evaluate the sizing of transistors? **[6]**

c) Write short note on layout rules. **[8]**

*Q11)*a) Explain stuck at - 0 and stuck at - 1 faults.   **[8]**

b) Explain TAP controller with its state diagram.   **[8]**

OR

*Q12)*a) What is the need of design for testability? Explain in short different types of faults.   **[8]**

b) What is need of boundary scan? Give suitable examples.   **[8]**

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P450

[4064]-117

B.E. (Electronics)
DIGITAL IMAGE PROCESSING
(2003 Course) (404212) (Elective - II) (Sem. - II)

Time : 3 Hours] *[Max. Marks : 100*

Instructions to the candidates:

   1)   *Solve Q.No.1 or Q.No.2, Q.No.3 or Q.No.4, Q.No.5 or Q.No.6 from Section - I & Q.No.7 or Q.No.8, Q.No.9 or Q.No.10, Q.No.11 or Q.No.12 from Section - II.*

   2)   *Answers to the two sections should be written in separate books.*

   3)   *Neat diagrams must be drawn wherever necessary.*

   4)   *Figures to the right indicate full marks.*

   5)   *Use of logarithmic tables slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.*

   6)   *Assume suitable data, if necessary.*

SECTION - I

Q1) a)   Draw the block diagram of a typical image processing system and explain function of each block. **[8]**

    b)   Explain the following terms : **[8]**

      i)   Critical fusion frequency.   ii)   Simultaneous contrast.

      iii)   Spatial Vs temporal effects.   iv)   Visibility function.

OR

Q2) a)   Explain following statistical parameters for an image & calculate all these parameters for segment of an image given below : **[8]**

      i)   Mean   ii)   Variance

      iii)   Standard deviation   iv)   Histogram.

$$\text{img} = \begin{bmatrix} 20 & 140 & 100 & 20 \\ 20 & 140 & 100 & 20 \\ 240 & 140 & 240 & 240 \\ 240 & 140 & 240 & 240 \end{bmatrix}$$

    b)   Draw & explain gray level human vision model. **[8]**

P.T.O.

Q3) a) Explain Hadamard transform & derive Hadamard matrix of order 8. What is sequency? **[8]**

b) Explain the need of color models. Compare YIQ & HIS color models. **[8]**

OR

Q4) a) Explain the K-L transform & its importance. Compare it with DCT.**[8]**

b) Explain YIQ domain representation of color. How this domain representation is useful in image enhancement algorithms like filtering.**[8]**

Q5) a) Explain Histogram & its significance? Obtain the histogram & histogram equilized image for the image segment given for Q.2 a).**[8]**

b) Explain the different techniques for sharpening of an image in spatial domain. **[10]**

OR

Q6) a) What is image enhancement and how it is different from image restoration. Explain in short following image enhancement techniques. **[10]**

i) Intensity level slicing.

ii) Negative of an image.

iii) Power law transformation.

iv) Contrast stretching.

b) How 2-D DFT can be centered (i.e. Average value will be at the center). How this DFT image can be used for low pass or high pass filtering.**[8]**

SECTION - II

Q7) a) Explain different types of redundancies present in an image. State techniques to remove each of them. **[8]**

b) How DCT is useful in image compression? Explain zonal coding & threshold coding techniques. **[8]**

OR

Q8) a) Consider 8 × 4, 8 bit image with digitized gray levels as shown below:

$$\begin{bmatrix} 21 & 21 & 21 & 95 & 169 & 243 & 243 & 243 \\ 21 & 21 & 21 & 95 & 169 & 243 & 243 & 243 \\ 21 & 21 & 21 & 95 & 169 & 243 & 243 & 243 \\ 21 & 21 & 21 & 95 & 169 & 243 & 243 & 243 \end{bmatrix}$$

Determine the entropy & compressibility due to coding of above image. Also generate a simple Huffman code-book for different gray levels of an image. **[8]**

   b) What is difference between loss-less and lossy compression technique. Explain in detail Arithmatic coding with example. **[8]**

Q9) a) What is skeleton? Explain the algorithm to obtain skeleton of an object in a digital image. **[8]**

   b) Explain four different boundary descriptors in detail. **[8]**

OR

*Q10)*a) Explain 4-directional & 8-directional chain coding with example. Hence obtain the object shape represented by 8-directional chain code 466001225642. Assume suitable distance between chain code. **[8]**

   b) What is edge detection? How edge detection algorithm can be used to detect the liquid level content of a transperent bottle. Propose the complete algorithm & state clearly all the assumptions made. **[8]**

*Q11)*a) Explain spatial domain filtering techniques for image restoration in the presence of noise. **[10]**

   b) Explain in detail application of image processing in remote sensing. **[8]**

OR

*Q12)*a) Draw & explain the model of image degradation & restoration. Discuss the various methods of estimating the degradation function. **[10]**

   b) Explain with block diagram all the steps of character recognition. State the assumptions made. **[8]**

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P452

[4064]-122
B.E. (E&TC)
VOICE NETWORKS
(404215) (2003 Course) (Sem. - I)

Time : 3 Hours] *[Max. Marks : 100*

Instructions to the candidates:

1) *Answers to the two sections should be written in separate books.*
2) *Neat diagrams must be drawn wherever necessary.*
3) *Figures to the right indicate full marks.*
4) *Use of logarithmic tables, slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.*
5) *Assume suitable data, if necessary.*

SECTION - I

Q1) a) What are the different levels of control functions in a Distributed SPC? Explain the operations of each level in detail. **[8]**

b) Explain the memory controlled time division time switching with neat diagram. **[6]**

c) Calculate the Unavailability of Dual Processor system for a period of 30 years if its MTBF = 4000 Hrs and MTTR = 9 Hrs. **[4]**

OR

Q2) a) Explain the concept of Message switching and Packet switching in a typical S & F switching network. **[6]**

b) Explain different modes of configuration of Dual Processor Architecture. **[6]**

c) Compare Single Stage and Multistage switching network. **[6]**

Q3) a) A call processor in an exchange requires 120 ms to service a complete call. What is the BHCA rating for the processor? If the exchange is capable of carrying 700 Erlangs of traffic, what is the call completion rate? Assume an average call holding time of 3 minutes. **[6]**

b) Define Grade of Service and Blocking Probability. **[6]**

c) Explain "Erlang B" Formula for Blocking Probability. **[4]**

P.T.O.

Q4) a) Following Data is collected to estimate voice traffic during 2 hour period.

Call No.	Call duration in seconds
1	95
2	89
3	65
4	100
5	72
6	68
7	54

Calculate the Traffic intensity in Erlangs, CS and CCS. **[6]**

b) Describe Call Congestion and Time Congestion. **[6]**

c) Describe different traffic measurement units in telecommunication network. **[4]**

Q5) a) What is ISDN? List and explain various services provided by ISDN.**[8]**

b) Briefly explain various interfaces used in ISDN. **[8]**

OR

Q6) a) What are the devices used in order to provide ISDN services? Explain each one of them in detail. **[8]**

b) Describe the significance of B & D channel in ISDN. **[8]**

SECTION - II

Q7) a) Explain in detail various mechanism to enhance spectral efficiency.**[10]**

b) Describe Radio link features in GSM system. **[8]**

OR

Q8) a) Explain how the security aspect handled in GSM network. **[8]**

b) Explain in detail logical channels used in GSM system. **[10]**

Q9) a) Describe Physical and Logical Channels of IS-95. **[8]**

b) "CDMA is having better security than GSM". Justify. **[8]**

OR

*Q10)*a) Draw the architecture of IS-95 system and explain in detail various functional entities. **[8]**

b) Compare IS-95 and CDMA-2000 system in detail. **[8]**

*Q11)*a) Describe speech coding technique i.e. ADPCM in detail. **[8]**

b) Describe in detail MEGACO/H.248 Protocol. **[8]**

OR

*Q12)*a) Explain in detail various low level protocols used in IP telephony.**[8]**

b) Compare IP telephony protocols : H.323 Vs SIP. **[8]**

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P459

[4064]-131
B.E. (E & T/C)
TELECOMMUNICATION NETWORK AND MANAGEMENT
(2003 Course) (404223) (Sem. - II)

Time : 3 Hours]   *[Max. Marks : 100*

Instructions to the candidates:

    1)   Use two separate answer books for Section - I and Section - II.

    2)   Read the questions carefully and concentrate on intensions of questions asked.

    3)   Answer to the point will be given the weightage.

    4)   Whenever necessary, use neat diagrams to express your views.

    5)   If necessary, use of Logarithmic Tables or Slide Rule or Pocket calculator.

    6)   Figures to right side of question indicate marks.

    7)   Assume suitable data, if necessary.

SECTION - I

Q1) How Computer Telecommunication networks are represented in the form of layers? What is the need of representing computer network in the form of layers? Describe OSI reference model in detail mentioning the functions of each layer. Describe how these layers are used communcation between two users.   **[18]**

OR

Q2) Which are the most popular packet switched technologies? Describe them in detail.   **[18]**

Q3) To which class of networks frame relay networks belongs whether circuit switched of packet switched? What are the advantages of frame relay networks over its predecessors? What are the features of Frame Relay Networks? Describe frame relay networks using neat diagram.   **[16]**

OR

P.T.O.

Q4) Bring out the differences between Switched Virtual Connection (SVC) and Permanent Virtual Connection (PVC). How SVCs are identified in Frame Relay Networks? What DLCI Represents? How DLCIs are assigned in frame relay networks? What is the relevance of LMI specification in Frame Relay Networks? **[16]**

Q5) Write Notes on :
   a)   Digital Subscriber Lines (DSL). **[8]**
   b)   Broadband Cable Modem. **[8]**

OR

Q6) Write Notes on :
   a)   Local Multipoint Distribution Systems. **[8]**
   b)   ADSL verses SDSL. **[8]**

SECTION - II

Q7) What are various types of routing methods? Explain them in detail. **[16]**

OR

Q8) What is static and dynamic routing? With the help of neat diagrams explain static and dynamic routing in detail? **[16]**

Q9) Write Notes on :
   a)   Delay and jitter in Networks. **[8]**
   b)   Bandwidth and Crosstalk in Networks. **[8]**

OR

*Q10)*a)   Describe various issues in Network operation and maintenance. **[8]**
   b)   Discuss security aspects of networks and how security is ensured. **[8]**

*Q11)*What are the traps? To which devices traps are associated? How traps are represented? What information traps contain? **[18]**

OR

Q12) Answer only in one sentence :   **[18]**

    a)   What is network protection?

    b)   What are the basic requirement of protection?

    c)   What are the network protection Mechanisms?

    d)   What are the approaches for implementation of protection mechanisms?

    e)   What are the scopes of repair?

    f)   What are the two layers of recovery model?

    g)   Which layer is responsible for providing QoS?

    h)   What is network survivability?

    i)   What is the use of Repeater?

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P464

[4064]-144

B.E. (Instrumentation & Control)
BIOMEDICAL INSTRUMENTATION
(406264) (2003 Course) (Elective - I) (Sem. - I)

Time : 3 Hours]   *[Max. Marks : 100*

Instructions to the candidates:

1) *Any three questions from each section.*
2) *Answers to the two sections should be written in separate books.*
3) *Neat diagrams must be drawn wherever necessary.*
4) *Figures to right indicate full marks.*
5) *Assume suitable data, if necessary.*

SECTION - I

Q1) a) Why silver-silver chloride electrode is suitable in biomedical applications. **[6]**

b) Explain Electrode offset potential? How effect of electrode offset potential is overcome. **[6]**

c) What are the voltage range, frequency range, and electrode used for ECG, EMG and EEG signals? **[6]**

OR

Q2) a) Explain various types of basic bio-electrodes used for bioelectric potential measurements along with their materials. Explain various properties that bio-electrode should possesses. **[10]**

b) Define Half cell potential? Draw and explain Electrode Electrolyte tissue interface equivalent circuit model. **[8]**

Q3) a) Explain the phenomenon of ECG genesis. **[8]**

b) Why ECG preamplifier should be multistage amplifier. Discuss the importance of isolation amplifier in ECG Machine. **[8]**

P.T.O.

Q4) a) Explain the lead configuration of ECG machine in detail. **[8]**

b) Enlist the various preamplifiers used in biomedical applications. Explain chopper amplifier in detail. **[8]**

Q5) a) Explain the two important techniques used in sphygomanometric blood pressure measurement. Distinguish between direct and indirect B.P. measurement. **[8]**

b) Define the term : **[8]**
Cardiac output, Mean Arterial Pressure, Systolic Pressure, Diastolic Pressure.

OR

Q6) a) Draw and explain electromagnetic blood flow meter with transformer voltage handling technique. **[8]**

b) Explain the operating principle of ultrasonic blood flow measurement along with neat diagram. Specify the transducer and operating frequency of the measuring signal. **[8]**

SECTION - II

Q7) a) What is EEG? List out various waveforms generated during EEG along with frequency range. State significance of each waveform. **[10]**

b) List out electrodes used in EEG. Explain the EEG 10-20 montage system. **[8]**

OR

Q8) a) Draw and explain the structure of neuron. How unidirectional flow of signal is maintained in neuron transmission. **[10]**

b) Define the term : **[8]**
Efferent Nerves, Afferent Nerves, Biofeedback, Evoked Potential

Q9) a) Enlist various ophthalmic instruments & explain tonometer in detail. **[10]**

b) Explain the role of Cones and Rods in human vision. **[4]**

c) Suggest suitable devices that are used to recover the percentage losses in EAR or EYE, if some residual capacity has been remain with these organs. **[2]**

OR

*Q10)*a) Define a "Hearing threshold". Explain the Bekesy audiometer with neat block diagram. **[8]**

b) What are three main sections of Human auditory system? Explain the middle Ear functioning. **[8]**

*Q11)*a) What is Spiro gram? Draw & explain spirogram with various lung volume capacities. **[10]**

b) Draw and explain infrared gas analyzer. **[6]**

OR

*Q12)*a) What are the parameters on which electrical hazards are depends? Discuss the effect of electric current on human body depends on current levels.**[10]**

b) Define the term : **[6]**

Lung compliance Let go current, Hold on current

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P467

[4064]-181

B.E. (Chemical)

PROCESS DYNAMICS & CONTROL

(2003 Course) (Sem. - I) (409342)

Time : 3 Hours]   *[Max. Marks : 100*

Instructions to the candidates:

   1)   *Answers to the two sections should be written in separate books.*

   2)   *Neat diagrams must be drawn wherever necessary.*

   3)   *Figures to the right indicate full marks.*

   4)   *Use of logarithmic tables slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.*

   5)   *Assume suitable data, if necessary.*

SECTION - I

Q1) a) Discuss the history of process control.   **[8]**

      b) What are the incentives for process control in chemical plant?   **[8]**

OR

Q2) a) Explain the design elements of control system.   **[8]**

      b) Discuss the languages of process control.   **[8]**

Q3) Derive the input-output model and transfer function model for stirred tank Heater.   **[16]**

OR

Q4) Develop the transfer function model for two non-interacting liquid level system. Draw a neat sketch & state assumptions.   **[16]**

Q5) A first order process having transfer function i.e. $G_P = \dfrac{kp}{\tau s + 1}$ is controlled by PI controller. Neglecting the dynamics of measuring instrument and final control element i.e. $G_m = G_f = 1$, develop a closed-loop transfer function and estimate the following.   **[18]**

      a) Closed-loop time constant.

      b) Closed-loop gain.

OR

Q6) Discuss the open loop response of :   **[18]**

    a)   On-off control.

    b)   P-control.

    c)   PI-control.

SECTION - II

Q7) Define controller tuning and explain   **[16]**

    a)   Zeigler-Nichols method &

    b)   Cohen-coon method of tuning.

OR

Q8) a)   Draw a root-locus diagram for PI controller.   **[8]**

    b)   Draw a nyquist plot for PD control.   **[8]**

Q9) Discuss the following with suitable sketch.   **[18]**

    a)   Cascade control.

    b)   Feed-forward control.

OR

Q10) Draw a neat sketch and discuss with suitable examples for :   **[18]**

    a)   Ratio control.

    b)   Over ride control.

Q11) Draw an instrumentation diagram and discuss all the details and working of distillation column control.   **[16]**

OR

Q12) Draw a neat sketch for instrumentation and control of CSTR. Discuss all the details and functioning of the loop.   **[16]**

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P469

[4064]-183

B.E. (Chemical)
CHEMICAL PROCESS SYNTHESIS
(2003 Course) (409344) (Sem. - I)

Time : 3 Hours]   *[Max. Marks : 100*

Instructions to the candidates:

   1)   *Answers to the two sections should be written in separate books.*
   2)   *Neat diagrams must be drawn wherever necessary.*
   3)   *Figures to the right indicate full marks.*
   4)   *Use of logarithmic tables, slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.*
   5)   *Assume suitable data, if necessary.*

SECTION - I

Q1) a) Discuss hierarchy of chemical process design.   **[8]**

     b) Mention different types of reaction systems and discuss any two with suitable example.   **[8]**

OR

Q2) a) What are idealized reactor models?   **[8]**

     b) Explain the concept of onion model.   **[8]**

Q3) a) Describe various parameters to analyze reactor performance.   **[8]**

     b) Discuss principle, working and construction of cyclone separator and hydrocyclone separator.   **[8]**

OR

Q4) Explain the effect of following parameters on choice of reactor.   **[16]**

     a) Concentration.

     b) Catalyst.

Q5) a) Explain the principle degrees of freedom in evaporator design.   **[10]**

     b) Discuss various types of dryers.   **[8]**

OR

P.T.O.

Q6) Write short notes on : **[18]**

    a) Absorption.

    b) Centrifugal separation.

    c) Reactor Design.

SECTION - II

Q7) a) Discuss in brief thermal coupling of prefractionator arrangement. **[8]**

    b) Explain distillation sequencing for 5 component systems with diagram.**[8]**

OR

Q8) a) Discuss optimization of a reducible structure. **[8]**

    b) Explain composition profiles for the middle product in the columns of the direct sequence for remixing effects. **[8]**

Q9) a) Explain composit curves with suitable example related to heat recovery problems. **[8]**

    b) What is simple furnace method. **[8]**

OR

Q10) a) Explain threshold problems in utility selection. **[8]**

    b) Explain integration of refrigeration cycles. **[8]**

Q11) Explain in details the attenuation of hazardous materials. **[18]**

OR

Q12) Write short note on : **[18]**

    a) Safety devices.

    b) Hazard triangle.

    c) Unconfined vapour cloud explosion.

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P470

[4064]-192

B.E. (Chemical)
PROJECT COSTING AND APPRAISAL
(2003 Course) (409350) (Sem. - II)

Time : 3 Hours]   *[Max. Marks : 100*

Instructions to the candidates:

    1)   Answer three questions from each section.

    2)   Answers to the two sections should be written in separate books.

    3)   Neat diagrams must be drawn wherever necessary.

    4)   Figures to the right indicate full marks.

    5)   Use of logarithmic tables, slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.

    6)   Assume suitable data, if necessary.

SECTION - I

Q1) a) Explain the concept of market survey and compare it with market research.

                                                                               [8]

    b) What is meant by project evaluation? Explain.   **[8]**

<div align="center">OR</div>

Q2) Explain the terms in detail: **[16]**

    a) Supply and demand.

    b) Returns.

    c) Break even chart.

    d) Techno-economic feasibility.

Q3) a) Discuss the statement of income and expenditure in detail.   **[8]**

    b) What is ratio analysis discuss various ratios.   **[8]**

<div align="center">OR</div>

Q4) a) Discuss with example the concept of journal and ledger entries. Explain statement of income & expenditure.   **[8]**

    b) Explain the balance sheet with detailed analysis.   **[8]**

Q5) a) What are the basic factors involved in equipment costing? **[8]**

b) Explain how the allocation of over heads of various cost elements is worked out. **[10]**

OR

Q6) a) Calculate in detail the cost of any equipment of your choice giving details about technical specifications and costing of the equipment. **[8]**

b) Explain the terms : **[10]**
i) Prime Cost.
ii) Cost Index.

SECTION - II

Q7) a) Write in detail about various methods for raising the finance. **[8]**

b) Explain the terms : **[8]**
i) Bonds.
ii) Types of interest

OR

Q8) a) It is desired to borrow Rs. 1,000 to meet a financial obligation. This money can be borrowed from a loan agency at a monthly interest rate of 2 percent. Determine the following : **[8]**
i) The total amount of principal plus simple interest due after 2 years if no intermediate payments are made.
ii) The total amount of principal plus compounded interest due after 2 years if no intermediate payments are made.
iii) The nominal interest rate when the interest is compounded monthly.
iv) The effective interest rate when the interest is compounded monthly.

b) Explain need of insurance in chemical industry. **[8]**

Q9) a) Explain in detail cash flow diagram. **[8]**

b) Explain the concept of taxes and their types. **[8]**

OR

Q10) a) Discuss the concept of marginal additional investment. **[8]**

b) Explain the terms :
i) Capitalized cost.
ii) Payout period. **[8]**

Q11) a) Define depreciation and discuss its need and significance with limitations. **[8]**

b) Discuss various methods of determining depreciation charge. **[10]**

OR

Q12) The original value of a piece of equipment is Rs. 22,000, completely installed and ready for use.

Its salvage value is estimated to be Rs. 2000 at the end of a service life estimated to be 10 years.

Determine the asset (or book) value of the equipment at the end of 5 years using : **[18]**

a) Straight-line method.

b) Textbook declining-balance method.

c) Double declining-balance (200 percent)

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P471

[4064]-200A

B.E. (Chemical)

PETROCHEMICAL ENGINEERING

(2003 Course) (409348) (Sem. - II) (Elective - II)

Time : 3 Hours]   *[Max. Marks : 100*

Instructions to the candidates:

  1) *Answers to the two sections should be written in separate books.*
  2) *Neat diagrams must be drawn wherever necessary.*
  3) *Figures to the right indicate full marks.*
  4) *Use of logarithmic tables slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.*
  5) *Assume suitable data, if necessary.*

SECTION - I

Q1) a) Describe the conditions under which petroleum crude is formed.   **[6]**

b) What is petroleum crude. How is it formed.   **[6]**

c) Explain in brief the status of petrochemical industry in India.   **[6]**

OR

Q2) a) State the classification of petrochemical products.   **[9]**

b) Explain the usage pattern of basic intermediates petrochemicals.   **[9]**

Q3) a) Explain Cumene process for phenol production with neat flowsheet. State the major engineering products associated with this process.   **[8]**

b) Explain the manufacturing ethylene. What are the different applications of ethylene.   **[8]**

OR

Q4) With a flowsheet, describe how acetylene can be manufactured. What are different applications of acetylene.   **[16]**

Q5) a) What is cracking? What are the different types of cracking.   **[8]**

b) What are the effects of operating variables on thermal cracking.   **[8]**

Q6) a) Describe the Tubestill process of thermal cracking. **[8]**

b) Explain Cracker furnace flare. **[8]**

SECTION - II

Q7) Explain the Olefin manufacture with neat flow sheet. **[16]**

OR

Q8) a) What are the different available processes for glycol manufacture. Explain ethylene glycol manufacture. **[8]**

b) Explain the production method for dimethyl ketone using propylene as the starting material. **[8]**

Q9) a) Explain the Bulk polymerisation with suitable example. **[8]**

b) Explain the manufacturing process for polyvinyl chloride. **[8]**

OR

Q10) a) Explain Emulsion polymerisation of styrene. **[8]**

b) Discuss polymer synthesis and monomer purification **[8]**

Q11) What are the different pollutants which pollute air in an oil refinery. What are the tolerance limits fixed by ISI (Indian Standard Institution) for oil refineries for polluting air and water. **[18]**

OR

Q12) a) Explain the control of emission from steam crackers using Best Available Technique (BAT) **[9]**

b) What do you imply by safety in an oil refining industry. **[9]**

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P472

[4064]-202

B.E. (Petroleum Engineering)
PETROLEUM EXPLORATION
(2003 Course) (Sem. - I) (412382)

Time : 3 Hours]   *[Max. Marks : 100*

Instructions to the candidates:

1) *Answers to the two sections should be written in separate books.*
2) *Answer any two questions each from Section I and Section II.*
3) *Neat diagrams should be drawn wherever necessary.*
4) *Use of cm scale graph paper is allowed.*
5) *Assume additional data if required.*

SECTION - I

Q1) a) Explain the term gravity anomaly. With the help of a neat diagram explain the construction and working of <u>any one</u> type of a gravimeter. Give details of the corrections used in gravity survey data. **[15]**

b) Following is a data recorded during a Wenner spread lateral traverse arrangement in a sedimentary basin to delineate a sandstone –mudstone –sandstone sequence. Draw a graph of electrode spacing against apparent resistivity. Identify the mudstone on the curve and estimate the thickness of mudstone. Justify your answer. (use cm scale graph paper) **[10]**

Electrode spacing in m	Apparent resistivity in Ωm	Electrode spacing in m	Apparent resistivity in Ωm
0.69	86	10.00	950
1.0	99	14.68	500
1.47	120	21.54	350
2.15	455	31.62	210
3.16	765	46.42	140
4.64	925	68.13	80
6.81	1300	100.00	50

OR

Q2) a) Details of a gravity survey conducted in a sedimentary basin are given below. The distance between stations is 50m. Draw the anomaly curve for the following data obtained during the survey. Calculate value of Δg using half anomaly width technique. Give possible correlations of the causative body. **[10]**

P.T.O.

Station number	Value of Δg	Station number	Value of Δg
01	0.1800	06	0.6890
02	0.2200	07	0.4800
03	0.3800	08	0.3900
04	0.4600	09	0.2400
05	0.6900	10	0.1900

b) Explain the working principle of a proton–precession magnetometer with suitable diagram. **[10]**

c) Write a note on Techniques to remove regional effects in magnetic anomaly maps. **[5]**

Q3) a) How are isotope surveys useful in geochemical exploration of petroleum? **[9]**

b) Answer **any two** of the following : **[16]**

    i) What are the different modes of transport of hydrocarbons from the seal of the reservoir to the surface in case of micro seepages?

    ii) What are the possible weathering processes of petroleum seepages?

    iii) Describe in brief the field procedure adopted for geochemical surveys.

OR

Q4) a) How is geochemical method effectively used as an exploration tool in new areas? **[10]**

b) Draw and explain Schlumberger arrangement of electrical resistivity survey. **[10]**

c) The given diagram shows a trace of interval velocities along with the compaction trend with increasing depth. **[5]**
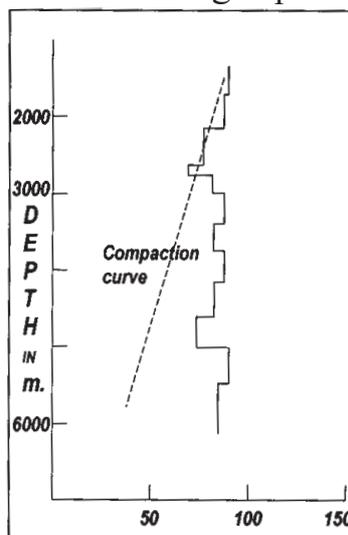
Log interval transit time, μ sec / foot

What may be the conclusion derived from curve? Give your comments.

SECTION - II

Q5) a) How is depth of a reflecting layer calculated in seismic reflection survey assuming horizontal reflector and dipping reflector? **[10]**

b) What are "Seismic facies"? How are they mapped? **[10]**

c) What is a possibility of occurrence of commercial reservoir for the following data? Explain the risk involved. **[5]**

EVENT	PROBABILITY
Existence of source rock	0.85
Sufficient level of maturity of source rock	0.75
Migration path to reservoir	0.50
Reservoir rock with porosity and permeability	0.50
Existence and persistence of seal	0.75

OR

Q6) a) The table given below shows recorded time for the direct, reflected, and critical P waves versus distance from shot point for a certain seismic survey. **[10]**

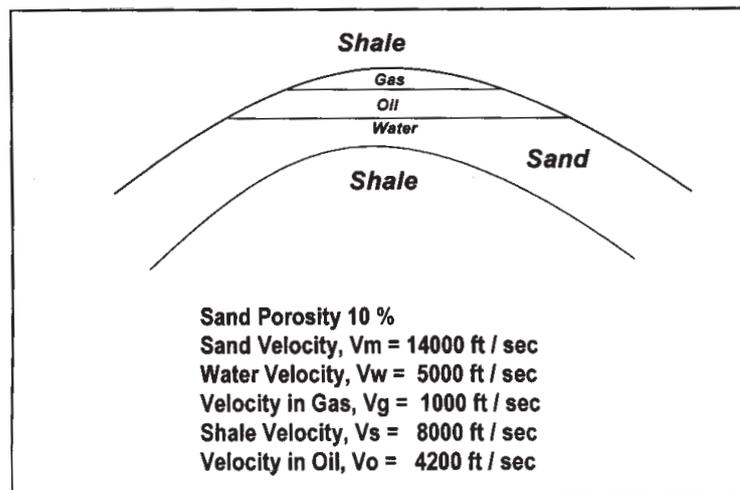| x (m)	T_d (ms)	T_r (ms)	T_c (ms)
0			
50	29	115	
100	56	124	
150	83	139	139
200	111	157	155
250	139	178	171
300	167	200	187
350	195	224	203
400	222	248	219
450	250	274	236
500	278	299	252
550	306	325	268
600	333	351	284
650	361	378	300
700	389	404	316

Plot the data on the graph and find

i) The wave velocity in two layers of rock.

ii) The depth to the horizontal interface.

b) Explain with the help of suitable diagrams how is reflection data used as a tool for stratigraphic and structural studies? **[15]**

Q7) a) The figure shown below is a model of the response of a lenticular reservoir with a gas cap, surrounded by shale. Water filled porosity in the reservoir reduces the average velocity so that a contrast is produced at the shale/ reservoir interface. Over the gas cap, velocity is further lowered further, increasing the contrast with the overlying shale and producing a seismic reflection survey of reversed polarity. **[10]**

What is this phenomenon?

Sand Porosity 10 %
Sand Velocity, Vm = 14000 ft / sec
Water Velocity, Vw = 5000 ft / sec
Velocity in Gas, Vg = 1000 ft / sec
Shale Velocity, Vs = 8000 ft / sec
Velocity in Oil, Vo = 4200 ft / sec

Calculate

i) The reflection coefficient at the gas cap, Rsg
ii) The reflection coefficient at the interface between shale and wet sand Rsw
iii) The reflection coefficient at the gas water boundary, Rgw

b) How one may proceed for exploration of hydrocarbons taking into consideration basin classification and history of occurrence of hydrocarbons? **[15]**

OR

Q8) a) What is NELP? What are the likely areas of exploration in India in future? How is risk discussed/addressed while exploring in frontier basins? **[15]**

b) Answer the following : **[10]**

i) How is deterministic approach in reserves estimation different than probabilistic approach?
ii) How does the asymmetry of folding control the area of reservoir during calculation of volumetric reserves?

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P473

[4064] - 203

B.E. (Petroleum Engineering)
PETROLEUM FORMATION EVALUATION
(2003 Course) (Sem. - I) (412383)

Time : 3 Hours]　　　　　　　　　　　　　　　　*[Max. Marks : 100*
Instructions to the candidates:

　　1)　*All questions are compulsory.*
　　2)　*Answers to the questions of both the sections should be written in separate answer books.*
　　3)　*Draw neat diagrams wherever necessary.*

SECTION - I

Q1) What is a log? What are the types of geophysical logging? How geophysical logging is useful in various stages of exploration and exploitation of oil reserves?

[15]

OR

What are the different neutron interactions with rocks? Describe the theory and <u>two</u> tools commonly used in nuclear radiation logging.

Q2) Explain important electrical logging methods with the help of neat sketches.

[15]

Q3) Write notes on <u>any four</u> of the following :　　　　　　　　**[20]**

　　a)　Logs used to measure geometry of borehole.
　　b)　MWD.
　　c)　Geochemical logs.
　　d)　Bore hole environment.
　　e)　Difficulties faced during logging of deviated wells.
　　f)　Temperature log.

SECTION - II

Q4) Outline the procedure for determination of water saturation using logs.**[20]**

OR

Write notes on any three of the following :
a) NMR logs.
b) Detection of over pressures.
c) Perforation.
d) Production Logging Tool, (PLT).
e) Acoustic logs.
f) Cross Plots.

Q5) Explain various methods used to evaluate quality of cementation. **[15]**

OR

Write short notes on any three of the following:
a) Methods used for downhole sampling of fluids.
b) Shaly sand evaluation.
c) Use of core analysis in formation evaluation.
d) Image logs and their applications.

Q6) How will you recognize various depositional environments using log patterns? Draw sketches to explain. **[15]**

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P474

[4064]-207

B.E. (Petroleum Engineering)

ENVIRONMENTAL SAFETY & HEALTH TECHNOLOGY IN PETROLEUM INDUSTRY

(412385) (Elective - I(3)) (2003 Course) (Sem. - I)

Time : 3 Hours]   *[Max. Marks : 100*

Instructions to the candidates:

1)   Answers 3 questions from each section.

2)   Que 5 & Que 10 are compulsory.

3)   Answers to the two sections should be written in separate books.

4)   Neat diagrams must be drawn wherever necessary.

5)   Figures to the right indicate full marks.

6)   Use of non programmable electronic pocket calculator is allowed.

7)   Assume suitable data, if necessary.

SECTION - I

Q1) a)   How HAZOP analysis is beneficial for any operation? Compare HAZOP analysis with other techniques available.   **[6]**

b)   How petroleum industry wastewater can be harmful to aquatic life? Discuss it with reference to current BP mishap in USA.   **[6]**

c)   How petroleum industry can affect air, water and soil pollution? What are its long term impacts on environment?   **[6]**

OR

Q2) a)   Give detailed classification of types of solids contained in waste water.**[6]**

b)   Discuss hazardous materials used in petroleum industry.   **[6]**

c)   How gas flaring can be reduced in petroleum industry? What are the consequences of natural gas flaring to environment?   **[6]**

Q3) a)   Discuss the physical principles used in following equipment skim pipes, Plate condensers, Gas / Air filtration units, hydro cyclones with neat sketch.   **[8]**

b)   How the quality of wastewater from any petroleum asset is assessed as per international norms?   **[8]**

P.T.O.

<div align="center">OR</div>

Q4) a) Write note on accidental discharges in terms of gaseous and liquid effluents in petroleum industry. **[6]**

b) Discuss the merits and demerits of V/H skimmers. **[6]**

c) What is significance of determining BOD and COD of any wastewater? **[4]**

Q5) a) Design skimmer TPI std. tank followed by DGF & (20 mg/lit) skim pile. Input = 50,000 bbl / day **[8]**

Maximum = 2% oil

Oil = 40°API & 20° API

Water salinity = 35,000 ppm

Rainfall = 2 inch / hr

Deck area = 1000 m²

(Finding d_m is discretionary)

b) Draw & explain working of up flow / down flow CPI. **[8]**

<div align="center">

SECTION - II
</div>

Q6) a) Write short notes on : **[12]**
   i) OHSAS 18001.
   ii) Root cause analysis.
   iii) Job safety analysis.
   iv) Work Permit system.

b) Why onshore / offshore well abandonment are done? What is its general procedure? **[4]**

<div align="center">OR</div>

Q7) a) What are advantages of Hydro cyclones over conventional methods?**[8]**

b) How safety audits are beneficial in any petroleum engineering work? How safety audits are conducted usually? **[8]**

Q8) a) What is domino theory? How it applies to accident preventions. **[6]**

b) Discuss the environmental aspects of oil field operations with Respect to (i) drilling (ii) production. **[6]**

c) What are effects of emulsification on the oil spills? **[6]**

OR

Q9) a) Discuss any two Secondary treatments available for wastewater treatment with help of neat sketch. **[6]**

b) Discuss the common legislation applicable to oil field operations. How this legislation helps to keep environment clean? **[8]**

c) What are Indian Standards for industries noise? **[4]**

*Q10)*Write note on : **[16]**

a) BOD & COD.

b) SVI.

c) Total solids in wastewater.

d) Oil soak sands.

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[4064] - 230C

B.E. (Petrochemical Engineering)

PETROLEUM EXPLORATION AND PRODUCTION OPERATIONS

(2003 Course) (Elective - II) (412411) (Sem. - II)

Time : 3 Hours]   *[Max. Marks : 100*

Instructions to the candidates:

     1)   *Answers to the two sections should be written in separate answer books.*

     2)   *Question No. 4 and 8 are compulsory. Out of remaining solve <u>any two</u> from each section.*

     3)   *Draw neat diagrams wherever necessary.*

<u>SECTION - I</u>

Q1) Describe important physical and chemical properties of crude oil and natural gas.   **[15]**

Q2) a)   List and explain in two lines important reservoir rock properties.   **[5]**

     b)   Describe a typical petroleum system with respect to source rock, reservoir rock, cap rock, trap and timing.   **[10]**

Q3) Explain the geochemical aspects of transformation of organic matter into hydrocarbon in a sedimentary basin.   **[15]**

Q4) Write short notes on <u>any four</u> of the following :   **[20]**

     a)   Reservoir drive mechanisms,

     b)   Reserves estimation,

     c)   Geophysical methods used in oil exploration,

     d)   Types and uses of oil well logging surveys and

     e)   Geological risk analysis.

SECTION - II

Q5) With the help of neat sketches, describe important components of a land rig. **[15]**

Q6) List and explain with the help of neat sketches various methods of oil well completion. **[15]**

Q7) a) Explain important EOR methods. **[10]**

b) Draw sketches to show important offshore drilling units. **[5]**

Q8) Write short notes on <u>any four</u> of the following : **[20]**

a) Factors that balance demand and supply of petroleum,

b) India's hydrocarbon potential,

c) Importance of natural gas for Indian industry,

d) Environmental impact of oil spills in offshore area,

e) Applications of microbiology in oil industry and

f) Refineries in India.

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P480

[4064]-232

B.E. (Polymer Engineering)
POLYMER PROCESSING OPERATIONS - I
(2003 Course) (Elective - II) (Sem. - I)

Time : 3 Hours]   *[Max. Marks : 100*

Instructions to the candidates:

 1) *Answer any three questions from Section - I and any three questions from Section - II.*

 2) *Answers to the two sections should be written in separate books.*

 3) *Draw neat diagrams wherever necessary.*

 4) *Numbers to the right indicate full marks.*

 5) *Assume suitable data, if necessary.*

 6) *Use of logarithmic table, electronic pocket calculator is allowed.*

SECTION - I

Q1) a) Explain the complete line of sheet extrusion with neat diagram. **[8]**

  b) Explain the design features of sheet die. **[8]**

<div align="center">OR</div>

Q2) a) Explain constructional features of a blown film die with neat diagram. **[8]**

  b) Explain the complete line of blown extrusion film with neat diagram.**[8]**

Q3) a) Explain Melt Fracture and sharkskin effect in Blow Molding. **[8]**

  b) Explain the causes and remedies in blow molding. **[8]**

  c) Define term Lay Flat width. **[2]**

<div align="center">OR</div>

Q4) a) Explain in detail Die swell in convergent and Divergent Die assembly. **[8]**

  b) Compare single and two stage Injection stretch blow molding of PET.**[8]**

  c) Discuss the process parameter which control the weight of the bottle.**[2]**

Q5) Write a note on the followings : **[16]**
   a)   Diaphragm thermoforming.
   b)   Plug assists pressure forming.
   c)   Texturing with reference to thermoforming.
   d)   Twin sheet Thermoforming.

OR

Q6) a)   Explain in detail about Mould cooling, vent holes, and surface treatment of thermoforming molds. **[8]**
   b)   Discuss different factors on which thermoformability depends. Analyse lower, upper and normal forming temperatures of the polymer with reference to thin gauge and heavy gauge sheet thermoforming. **[8]**

SECTION - II

Q7) a)   Explain with suitable example the process of Gas Injection Molding. **[8]**
   b)   Explain in detail two color Injection Molding Process. **[8]**

OR

Q8) a)   Explain with suitable example the process of Reaction Injection Molding. **[8]**
   b)   Explain the different sequences used for pattern generation in Injection molding. **[8]**

Q9) a)   Explain in detail design consideration of compression mold used for DMC. **[8]**
   b)   Discuss the effect of Bulk factor on shot weight consistency. **[8]**
   c)   Explain the term SMC. **[2]**

OR

Q10) a)   Explain the importance of preheating and performing prior to compression molding. **[8]**
   b)   Explain in detail the process of dielectric preheating for thermoset material. **[8]**
   c)   Explain the term DMC. **[2]**

*Q11)*a) Compare the process of transfer molding, compression molding and Injection molding of Thermoset materials. **[8]**

b) Compare flow cure relationship of material grades used for transfer, compression and Injection Molding. **[8]**

OR

*Q12)*a) Compare processing parameters of urea formaldehyde, phenol formaldehyde with reference to Transfer and compression molding process. **[8]**

b) Discuss various causes and remedies in Transfer molded process. **[8]**

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P482

[4064]-235

B.E. (Polymer Engineering)
POLYMER REACTION ENGINEERING
(2003 Course) (Elective - I) (409366) (Sem. - I)

Time : 3 Hours]   *[Max. Marks : 100*

Instructions to the candidates:

1) *Answers to the two sections should be written in separate books.*
2) *Draw neat diagrams wherever necessary.*
3) *Figures to the right indicate full marks.*
4) *Assume suitable data, if necessary.*
5) *Use of logarithmic table, electronic pocket calculators is allowed.*

SECTION - I

Q1) a) Explain the distinctive features of Polymerization Reaction Engineering.**[8]**

    b) Discuss the importance of molecular weight and Molecular weight distribution of polymer. **[8]**

OR

Q2) a) Explain the importance of viscosity change on the final polymer formed via polymerization reaction. **[8]**

    b) Explain the role of residence time distribution and the concentration history in Polymerization reaction. **[8]**

Q3) a) Discuss in detail all technical conclusions from Free Radical Kinetics Studies. **[8]**

    b) Derive the necessary relationship obtained in giving Molecular weight distribution in CSTR for free radical type polymerization. **[10]**

OR

Q4) a) Discuss in detail Molecular weight distribution obtained via step growth polymerization. **[10]**

    b) Discuss the Instantaneous number Degree Of Polymerization. **[8]**

Q5) a) Write a note on Ziegler Natta Polymerization. **[8]**

    b) Discuss in detail the three stages of Emulsion Polymerization. **[8]**

OR

Q6) Estimate a model for predicting rate of propagation in irreversible step growth polymerization at high conversion level where diffusion effect is predominates.

[16]

SECTION - II

Q7) a) Draw process flow sheet for the production of PET and explain the process in detail. **[8]**

b) Differentiate between the different polymerization techniques for manufacturing PVC. **[10]**

OR

Q8) Write a short note on reactor systems used for SBR rubber, Nylon 6, Polystyrene polymers. **[18]**

Q9) a) Discuss the role of mass transfer in step growth polymerization. **[8]**

b) Write a note on gel effect in step growth polymerization. **[8]**

OR

Q10) a) Discuss the effect of reaction conditions on the viscosity build up in free radical polymerization. **[8]**

b) Discuss the necessary equation of the total rate of the disappearance of the monomer M via Initiation, Propagation, and the termination reaction by monomer transfer. **[8]**

Q11) a) Explain the reactor design in terms of following factors Polymerization Mechanism, Stoichiometric Factors, Thermodynamics Factors, and Transport Limitations. **[8]**

b) Discuss the choice between batch and continuous reactor for polymer-ization process. **[8]**

OR

Q12) a) Write a short note on Reactor Selection for carrying out polymerization reaction. **[8]**

b) Discuss in detail the control problem in polymer reactor. **[8]**

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P483

[4064] - 237

B.E. (Polymer Engineering)
SURFACE COATING AND ADHESIVES
(Elective - I) (2003 Course) (409366) (Sem. - I)

Time : 3 Hours]   *[Max. Marks : 100*

Instructions to the candidates:
  1) *All questions are compulsory.*
  2) *Answers to the two sections should be written in separate books.*
  3) *Figures to the right indicate full marks.*

SECTION - I

Q1) a) Explain the process of film formation in paints. Give the reactions involved. **[8]**

  b) Write a note on exterior durability of paint. Give various test methods.**[9]**

OR

  a) Explain the role of at least three additives in paint. **[8]**

  b) Write in detail various resins used in paint manufacture. **[9]**

Q2) a) Explain the manufacture of alkyd resin. **[8]**

  b) Discuss the role of natural resins in paint manufacture. **[9]**

OR

  a) Compare paints, enamels, varnishes and lacquers. **[8]**

  b) Write a note on powder coating technique. **[9]**

Q3) a) With suitable examples give the importance of quality control in paint manufacture. **[8]**

  b) Discuss the test to determine package stability in paints. **[8]**

OR

  a) Write a note on hiding power in paints. Give its importance. **[8]**

  b) Write a note on health and safety issues in paint industry. **[8]**

P.T.O.

Q4) a) Explain adhesion. Discuss any two theories of adhesion.   **[8]**

    b) Write a note on diffusion and wettability.   **[9]**

<div align="center">OR</div>

    a) Write a note on advantages and disadvantages of adhesives.   **[8]**

    b) What do you understand by surface energetics?   **[9]**

Q5) a) Write a note on epoxy based adhesive.   **[8]**

    b) Explain hot melt adhesives.   **[9]**

<div align="center">OR</div>

    a) Explain the manufacture of acrylic modified adhesives.   **[8]**

    b) Compare synthetic adhesives over natural adhesives.   **[9]**

Q6) a) Explain ASTM testing standards for tack and viscosity in adhesive.**[8]**

    b) Discuss various types of joints in adhesion bonding.   **[8]**

<div align="center">OR</div>

    a) Write a note on cure time determination in adhesives.   **[8]**

    b) Explain how the surface characteristics of a substrate plays a role in adhesion.   **[8]**

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P484

[4064]-243

B.E. (Polymer)
FIBER TECHNOLOGY
(Back log) (409367) (2003 Course) (Elective - II) (Sem. - II)

Time : 3 Hours]   *[Max. Marks : 100*

Instructions to the candidates:
1) *Answers to section - I and section - II should be written on separate answer book.*
2) *Solve 3 questions from Section - I and 3 questions from Section - II.*
3) *Neat diagrams must be drawn wherever necessary.*
4) *Figures to the right indicate full marks.*
5) *Assume suitable data, if necessary.*
6) *Use of electronic pocket calculator is allowed.*

SECTION - I

Q1) a) Explain in detail the "Solution Spinning" technique.   **[8]**
   b) Write a short note on "High Speed Spinning" process in fiber manufacture.   **[6]**
   c) Enlist advantages of synthetic fibers.   **[4]**

OR

Q2) a) Explain in detail the "Melt Spinning" technique.   **[8]**
   b) Explain the following – Yarn, Filament, Tex, Denier, Tenacity, Staple fiber.   **[6]**
   c) Spinning Speed affects Fiber Morphology, Justify the statement.   **[4]**

Q3) a) What are the various sources of natural and synthetic fibers?   **[6]**
   b) Write a short note various Catalysts used in PET synthesis.   **[5]**
   c) What are the drawbacks of DEG presence in PET polymers?   **[5]**

OR

Q4) a) What are the raw materials for obtaining Nylon6 and Nylon66 fibers?**[4]**
   b) Enlist the factors affecting DEG formation in PET synthesis.   **[6]**
   c) Write short note on Integrated Continuous process used to synthesize Nylon6.   **[6]**

P.T.O.

Q5) a) Why is it necessary to use Spin finish used in fiber spinning operation? Explain any one method used for applying Spin finish. **[8]**

   b) What do you understand by texturing of fiber? Explain any one method of Texturing fibers. **[8]**

OR

Q6) a) What are the various constituents of Spin finish? Explain how spin finish affects dyeing of fibers. **[8]**

   b) What is drawing of fiber? Explain how drawing of fiber is carried out.**[8]**

SECTION - II

Q7) a) Explain in details the production of Filament Yarn. **[7]**

   b) Why is it necessary to carry out heat setting of fibers. **[3]**

   c) Write a short note on Identification and Analysis of fibers. **[8]**

OR

Q8) a) Explain "Direct Spinning" process for staple fiber production. **[9]**

   b) Enlist various models of fiber structure. Explain any one in detail. **[9]**

Q9) a) What are the various techniques used to dye polyester fibers? Explain any one in detail. **[8]**

   b) PP fibers are difficult to dye. True or False? Justify your answer. **[3]**

   c) Explain Acid and Basic dyeing. **[5]**

OR

*Q10)*a) Explain in detail Disperse dyeing and Carrier dyeing. **[8]**

   b) Write down merits and demerits of Mass Colouration. **[5]**

   c) Enlist the advantages of bi-component acrylic fibers. **[3]**

*Q11)*a) Explain in detail "Optical Fibers". **[7]**

   b) Write a short note on "Nanofibers". **[7]**

   c) What do you understand by hydrophilic acrylic fibers. **[2]**

OR

*Q12)*a) Explain in detail "Modification of Polyester Fibers". **[8]**

   b) Write a short note on "Non-woven Fibers". **[8]**

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P486

[4064]-256

B.E. (Computer Engineering)
ADVANCED DATABASES

(2003 Course) (Elective - I) (Sem. - I) (410445)

Time : 3 Hours]   [*Max. Marks : 100*

Instructions to the candidates:
1) *Answer any three questions from each section.*
2) *Answers to the two sections should be written in separate books.*
3) *Neat diagrams must be drawn wherever necessary.*
4) *Figures to the right indicate full marks.*
5) *Assume suitable data, if necessary.*

SECTION - I

Q1) a)   Compare the three partitioning techniques of parallel databases with respect to
   i)   Scanning the entire relation.
   ii)   Locating the tuple associatively.
   iii) Locating the tuple for which the value is in specific range.
                                                                                                  [10]
   b)   Explain Partitioned parallel hash join and Parallel nested loop join.   **[8]**

OR

Q2) a)   What is skew? What are its type? How it is handled in parallel databases?
                                                                                                  [10]
   b)   Describe the good way to parallelize each of following with example. **[8]**
   i)   The **difference** operation.
   ii)   Aggregation by **count** operation.
   iii) Aggregation by **avg** operation.
   iv)   Left outer join.

Q3) a)   Consider a relation that is fragmented horizontally by a plant - number. employee (name, address, salary, plant - number).   **[8]**
   Assume that each fragment has two replicas : One stored at New York site & other at plant site. Describe a good processing strategy for the following queries entered at San Jose site.
   i)   Find the average salary of employees.
   ii)   Find the highest paid employee at Toronoto site.
   iii) Find the lowest paid employee in company.
   b)   Explain 2-phase commit protocol & 3-phase commit protocol. State their differences.   **[8]**

OR

Q4) a) What are different locking protocols in distributed databases? Explain two of them? **[8]**

b) What is directory system? How LDAP can be used to provide multiple hierarchical views of data, without replicating the base-level data. **[8]**

Q5) a) Differentiate between XML DTD & XML schema? **[6]**

b) Explain SOAP architecture. **[6]**

c) What is FLWOR expression in XQuerry? **[4]**

OR

Q6) a) What is three tier architecture? Explain its advantage? **[8]**

b) Explain the structure of XML data with example. **[8]**

SECTION - II

Q7) a) Define data warehouse. Explain data warehouse schemas with example. **[8]**

b) Why data cleaning is required? Explain various data cleaning techniques. **[6]**

c) Explain roll-up, dice operation of OLAP. **[4]**

OR

Q8) a) Differentiate between OLTP & OLAP systems. **[4]**

b) Draw & explain architecture of data warehouse. **[6]**

c) Write a short notes on: **[8]**
   i) Data Mart.
   ii) OLAP implementation.

Q9) a) Explain in detail classification & prediction. What is difference between them. **[8]**

b) What is clustering? Explain k-means algorithm for clustering in brief. **[8]**

OR

Q10) a) Define following terms with example: **[6]**
   i) Frequent set.
   ii) Border set.
   iii) Maximal frequent set.

b) Explain in detail APRIORI algorithm with example. **[10]**

Q11) a) Describe web crawler and web search engine in details. **[8]**

b) Explain Similarity based Retrieval and Relevance using Hyperlinks retrieval. **[8]**

OR

Q12) a) What is structure and unstructured data? Explain TF - IDF method of Ranking? **[8]**

b) Explain the term with examples w.r.t. IR- **[8]**
   i)   Homonyms.
   ii) Synonyms.
   iii) Proximity.
   iv) Stop words.

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P487

[4064]-261

B.E. (Computer Engineering)

SOFTWARE TESTING & QUALITY ASSURANCE

(410450) (2003 Course) (Sem. - II) (Elective - I)

Time : 3 Hours]   *[Max. Marks : 100*

Instructions to the candidates:

   1) Answer any three questions from each section.

   2) Neat diagrams must be drawn wherever necessary.

   3) Figures to the right indicate full marks.

   4) Use of logarithmic tables, slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.

   5) Assume suitable data, if necessary.

SECTION - I

Q1) a)   Define measurement and briefly summarize the representation condition for each measurement.   **[9]**

    b)   Explain indirect measurement and meaningfulness using following measures.   **[9]**

       i)   Density $d = m/V$.

       ii)   Testing Efficiency $T = D/E$.

       iii) Predict $E = a\,S^b$

       iv) DeMillo and Lipton Effort measure.

OR

Q2) a)   Describe the measurement scale & describe each one.   **[9]**

    b)   How should one choose the appropriate prediction system? Explain.

                                               [9]

Q3) a)   Give the types of structural measures and explain.   **[8]**

    b)   What is Big-O notation? Give the types of complexity with example.**[8]**

OR

Q4) a)   Take any example as program of any language, Draw various flow graphs, give it's du-paths, c-uses, p-uses, defs also.   **[8]**

    b)   Give the Weyuker's properties for any software complexity metric. **[8]**

Q5) a) Explain the types of measurement tools. **[8]**

b) Describe test adequacy criteria & program based adequacy criteria. **[8]**

OR

Q6) a) How one should revisit the measurement plan periodically to decide if changes are in the process. Write down Rewise Plan for the same with example. **[8]**

b) Explain Compatibility and Domain testing. **[8]**

SECTION - II

Q7) a) Give the types system tests. Draw the diagram which shows the documents which are useful for system testing & design. **[9]**

b) What are resources required for performance testing & Explain complete test bed. **[9]**

OR

Q8) a) What is security testing? Write the damaging factors for system & their causes. **[9]**

b) Explain the software test automation. **[9]**

Q9) a) Explain paroto analysis of software defects and component problem index. **[8]**

b) Draw and explain profile of software of customer satisfaction with software product. **[8]**

OR

Q10) a) Explain activities related to defect injection and it's removal. **[8]**

b) Explain fix backlog and backlog management index with chart or graph. **[8]**

Q11) a) Describe customer side preliminary activities in problem reporting of software products. **[8]**

b) Explain the repositories in problem reporting of software product. **[8]**

OR

Q12) a) Explain the problem categories & their suggested action in problem resolution of software product. **[8]**

b) Write the severity - 1 and severity - 2 problems in various product types in prioritizing the problem. **[8]**

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P488   **[4064]-263**

B.E. (Computer and IT) (Common)
SOFTWARE ARCHITECTURE

(2003 Course) (410451) (Sem. - II) (Elective - II)

Time : 3 Hours]   *[Max. Marks : 100*

Instructions to the candidates:
   1)   From Section - I, Answer Q.1 or Q.2 and Q.3 or Q.4 and Q5. or Q6.
   2)   From Section - II, Answer Q.7 or Q.8 and Q.9 or Q.10 and Q11. or Q12.
   3)   Figures to the right indicate full marks.
   4)   Answers to TWO sections should be written in separate answer books.
   5)   Make suitable assumptions wherever appropriate and relevant.

SECTION - I

Q1) a)   Write short notes on Architecture VIEWS.   **[6]**

   b)   How does software architecture help the business.   **[6]**

   c)   Write briefly on following: **[6]**

   i)   Use of Deployment diagrams to show allocation structures.

   ii)   Module structures.

OR

Q2) a)   Write short notes on advantages of adding a new phase "software architecture", to the classical waterfall model for software engineering.

[6]

   b)   Write short notes on LAYERED architecture.   **[6]**

   c)   Compare and contrast the analogy of software architecture with civil engineering architecture (buildings, bridges).   **[6]**

Q3) a)   List out some common user friendly features seen in email applications.

   (Hint : email applications like gmail, yahoomail, hotmail)   **[6]**

   b)   What do you understand by quality aspect 'MODIFIABILITY' and discuss modifiability tactics like CONFIGURATION.   **[6]**

   c)   What do you understand by nonfunctional requirements.   **[4]**

OR

Q4) Explain and illustrate the following concepts (in context of quality attribute/ tactics) with examples, in brief **[16]**

    a)   USABILITY.

    b)   Interfaces and ease of modifiability.

    c)   Authentication as a security tactic.

    d)   Performance, response time, throughput.

Q5) a)   Write how class diagrams can be used for explaining Design patterns.

                                                                                      [4]

    b)   Give intent/motivation for Singleton pattern, with examples.   **[6]**

    c)   Draw a CLASS diagram for Observer pattern and explain it.   **[6]**

<div align="center">OR</div>

Q6) a)   Give applications of Observer pattern.   **[4]**

    b)   Write short notes on design patterns.   **[6]**

    c)   What are the various types of proxy patterns.   **[6]**

<div align="center">

SECTION - II

</div>

Q7) a)   Write on EJB3 feature ANNOTATIONS.   **[4]**

    b)   What is difference between RMI, RPC?   **[4]**

    c)   Compare and contrast Java and J2EE.   **[4]**

    d)   What is socket programming.   **[4]**

<div align="center">OR</div>

Q8) a)   What are different types of EJBs?   **[4]**

    b)   Discuss how JDBC is used by web applications.   **[4]**

    c)   Compare use of XML on client side and server side.   **[4]**

    d)   What are advantages of JSF?   **[4]**

Q9) Explain following W<u>eb</u> <u>Client</u> side concepts through simple examples.   **[16]**

    a)   Browser differences.

    b)   Use of Active X controls.

    c)   XHTML.

    d)   Java applets.

<div align="center">OR</div>

Q10) a)   Consider an online BANKING application, draw a diagram for a 3 tier architecture for this system. Make suitable assumptions about the features/ scope of online bank.   **[4]**

    b)   What is XML, give an example of user defined tags for STUDENTS information in a typical college system and a sample XML file to depict use of those tags.   **[4]**

    c)   What are JSP tags?   **[4]**

    d)   Why JSPs when they are any ways converted to servlets.   **[4]**

Q11) Write short Notes on ANY THREE: **[18]**

    a)   COM versus .NET.

    b)   Web service and SOA.

    c)   .NET and Advantages of .NET.

    d)   Use of .NET for web applications.

<div align="center">OR</div>

Q12) Explain in context of COM/.NET the following briefly.   **[18]**

    a)   .NET architecture (explain with help of a diagram)

    b)   Distributed applications.

    c)   Interfaces.

    d)   .NET assemblies.

    e)   C##, Visual basic supported by .NET.

    f)   DLL servers.

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P491

[4064]-277

B.E. (IT)

ORGANISATIONAL BEHAVIOUR & MANAGEMENT CONCEPTS

(Sem. - I) (2003 Course) (414445) (Elective - I)

Time : 3 Hours] [*Max. Marks : 100*

Instructions to the candidates:

    1)   All questions are compulsory.

    2)   Use separate answer books for Section - I & Section - II.

    3)   Figures to the right indicate full marks.

SECTION - I

Q1) Define the term O.B. Elaborate the different models of O.B. **[16]**

OR

What do you mean by the term organisational behaviour? Explain its relevance in today's Scenario.

Q2) Distinguish between formal & informal groups with its advantages & disadvantages. **[16]**

OR

Define stress with its causes & strategies to cope up with stress.

Q3) Write short notes on (Any 3): **[18]**

    a)   Morale Indicators.

    b)   Perception.

    c)   Types of motives.

    d)   Organisational climate.

    e)   Re-engineering.

SECTION - II

Q4) What are the qualities of a leader? Explain Fiedler's theory of leadership.

[16]

OR

What are the reasons for conflict at organisational work place? Elaborate constructive & destructive conflict.

P.T.O.

Q5) Define TQM. Explain the techniques of TQM, in detail. **[16]**

Q6) Write short notes on (Any three): **[18]**
   a) Organisational Climate.
   b) Path - Goal theory.
   c) Reasons for resistance of change.
   d) A.H. Maslow's theory of motivation.
   e) Organisational effectiveness.

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P492

[4064]-280

B.E. (I.T.)

INFORMATION RETRIEVAL

(2003 Course) (414450) (Sem. - II)

Time : 3 Hours]　　　　　　　　　　　　　　　　　　　　*[Max. Marks : 100*

Instructions to the candidates:

　　1)　Answer any three questions from each section.
　　2)　Answers to the two sections should be written in separate books.
　　3)　Neat diagrams must be drawn wherever necessary.
　　4)　Figures to the right indicate full marks.
　　5)　Assume suitable data, if necessary.

SECTION - I

Q1) What is Stop word removal and stemming? Is it a necessary step in preparing Document Representative? Why? **[16]**

OR

Q2) Differentiate between data retrieval and information retrieval. Why is relevance important in IR? Please mention what role 'relevance' plays in data retrieval. **[16]**

Q3) a) Explain: Cluster based retrieval and serial search. **[8]**

　　b) How is XML important in Information Retrieval? Explain XML data model. **[10]**

OR

Q4) a) Explain: fuzzy set model and Boolean model. **[8]**

　　b) What are inverted files and ring structure? **[10]**

Q5) a) What is user oriented measure? Explain relative recall and recall effort. **[8]**

　　b) Explain different evaluation measures for IR systems. **[8]**

OR

Q6) a) What are the different starting points for search interfaces? **[8]**

　　b) What are dendograms and SQL3? **[8]**

P.T.O.

SECTION - II

Q7) a) Discuss digital libraries and their architectural issues. **[8]**

b) Write a note on OPAC. **[8]**

OR

Q8) a) Discuss digital libraries and their document models. **[8]**

b) Write a note on MARC. **[8]**

Q9) a) Explain any one multimedia IR language. **[9]**

b) Explain one dimensional time series. **[9]**

OR

Q10) Write short notes on (any two): **[18]**

a) Automatic feature extraction.

b) GEMINI.

c) Multimedia IR languages.

Q11) a) Explain meta searchers. **[8]**

b) Compare parallel and distributed IR. **[8]**

OR

Q12) a) Explain query processing. **[8]**

b) Explain suffix arrays. **[8]**

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P495

[4064]-282
B.E. (Biotechnology)
ENZYME AND FERMENTATION ENGINEERING
(2003 Course) (416282) (Sem. - I)

Time : 3 Hours]   *[Max. Marks : 100*

Instructions to the candidates:

    1)   *Answers three questions from Section - I and three questions from Section - II.*

    2)   *Answers to the two sections should be written in separate answer books.*

    3)   *Neat diagrams must be drawn wherever necessary.*

    4)   *Figures to the right indicate full marks.*

SECTION - I

Q1) a)   Derive the Michaelis-Menten equation for describing the enzyme kinetics. Also state the assumptions made. **[8]**

      b)   What are the environmental factors affecting the growth of microbial biomass? Discuss each factor in detail. **[8]**

OR

Q2) a)   Describe in detail the mechanisms of catalysis of enzyme acting on two substrates. How are the kinetics determined in this case? **[8]**

      b)   What is the significance of maximum possible dilution rate? Derive an expression to determine the same. **[8]**

Q3) What are the two major types of fermentation? Discuss their characteristics, applications, advantages and disadvantages giving suitable examples. **[18]**

OR

Q4) Write notes on the following topics (any three) : **[18]**

      a)   Air-lift bioreactors.

      b)   Fed batch mode.

      c)   Chemostats.

      d)   Tray bioreactors.

      e)   Bubble column bioreactors.

      f)   Continuous mode.

Q5) a) Explain the effect of aeration on power consumption of an agitator in a fermenter. How is the power consumption calculated in this case?**[8]**

b) What are the various factors which affect oxygen uptake rate in a fermenter? Derive expressions for calculating the maximum possible growth rate and critical $k_L a$. **[8]**

OR

Q6) a) Describe how the dynamic method of gassing out is used for determination of mass transfer coefficient in a fermenter. **[8]**

b) What are the various factors which cause change in the rheology of fermentation broth? **[8]**

SECTION - II

Q7) a) What is HTST sterilization and why is it necessary in the fermentation industry? **[8]**

b) How do process parameters affect scale up of a fermenter system? How do we decide the best operating conditions? **[8]**

OR

Q8) Write notes on the following (any four) : **[16]**
   a) Inoculum development for a production scale fermenter.
   b) Thermal death kinetics.
   c) Nabla (del) factor.
   d) Continuous steam sterilization.
   e) Scale up window.
   f) Process parameters for scale up.

Q9) a) What are the different physical methods of enzyme immobilization?**[6]**

b) Derive an expression for kinetics of immobilized enzyme when only external mass transfer is dominant. **[6]**

c) Write a note on medical applications of immobilized enzymes. **[6]**

OR

*Q10)*a) What is micro-encapsulation of enzyme and how is it done? **[6]**

b) Explain the significance of Damköhler's number with respect to immobilized enzyme kinetics. **[6]**

c) Derive an expression for determining kinetics of enzymes immobilized on internal surface of support. **[6]**

*Q11)*Write notes on the following (any four) : **[16]**

a) Disposable fermenters.

b) Semi-synthetic process.

c) Design considerations for bioreactors using animal cultures.

d) Antibody production.

e) Microfermentation.

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P497

[4064]-284

B.E. (Biotechnology)
NOVEL SEPARATION TECHNIQUES
(2003 Course) (416284) (Sem. - I)

Time : 3 Hours]   *[Max. Marks : 100*

Instructions to the candidates:

1) *Answer three questions from Section - I and three questions from Section - II.*
2) *Answers to the two sections should be written in separate answer books.*
3) *Assume suitable data, if necessary.*
4) *Neat diagrams should be drawn whenever necessary.*
5) *Use of scientific calculator is allowed.*
6) *Figures to the right indicate full marks.*

SECTION - I

Q1) What are the stages involved in recovery of bioproducts? Explain each one of them in detail. **[18]**

OR

Q2) Explain the characteristics of fermentation broth. How do they affect separation processes? **[18]**

Q3) What is HPLC? Explain the instrumentation, principle and working of HPLC with neat sketch. Also discuss the operational challenges in HPLC. **[16]**

OR

Q4) a) Explain the internal standard and external standard method of analysis in gas chromatography. **[8]**

b) Differentiate between normal phase chromatography and reversed phase chromatography. **[8]**

Q5) a) What are the advantages of membrane separation processes over conventional separation process? **[8]**

b) What is reverse osmosis? Explain with suitable application. **[8]**

OR

Q6) a) Explain resistance in series model for dense membrane. **[8]**

b) Explain the types of Pervaporation membranes with suitable example. **[8]**

SECTION - II

Q7) a) Explain fluorescence spectroscopy in detail. **[10]**

b) Write a short note on 'UV Spectroscopy'. **[6]**

OR

Q8) a) Explain the principle and working of atomic emission spectroscopy. **[10]**

b) Write a note on 'Beer Lambert's Law'. **[6]**

Q9) Explain the various adsorption isotherm models in detail. **[16]**

OR

Q10) Write a note on: **[16]**

a) Pressure swing adsorption.

b) Temperature swing adsorption.

Q11) a) Explain the concept of reactive distillation. What are its advantages? **[10]**

b) Write a note on 'Extractive/reactive fermentation'. **[8]**

OR

Q12) What is meant by hyphenated technique? What are the advantages of hyphenated techniques? Explain any two hyphenated techniques in detail. **[18]**

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P515

[4064]-2

B.E. (Civil)
ENVIRONMENTAL ENGINEERING - II
(2003 Course) (401002) (Sem. - I)

Time : 3 Hours]   *[Max. Marks : 100*

Instructions to the candidates:

1) *Solve Q. 1 or Q. 2, Q. 3 or Q. 4 Q. 5 or Q. 6 from Section - I and Q. 7 or Q. 8, Q. 9 or Q. 10, Q. 11 or Q. 12 from Section - II.*
2) *Answers to the two sections should be written in separate books.*
3) *Neat diagrams must be drawn wherever necessary.*
4) *Figures to the right indicate full marks.*
5) *Use of logarithmic tables, slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.*
6) *Assume suitable data, if necessary.*

SECTION - I

Q1) a) Explain giving reasons, when to adopt separate and combined systems. **[6]**

b) The BOD_5 of waste has been measured as 450 mg/l. If rate constant is 0.12, find out ultimate BOD and 3 day BOD at 27°C. **[6]**

c) Differentiate between sanitary sewage and storm water runoff. **[4]**

OR

Q2) a) Design a sanitary sewer for the following data : **[6]**

i)   Population = 1,00,000 persons.
ii) Rate of water supply = 200 lit/capita/day.
iii) N = 0.013.
iv) Peak factor = 3.
v)   Slope = 1 in 700.

b) Explain procedure of B.O.D. test. **[6]**

c) Write a short note on testing of new sewers. **[4]**

Q3) a) Draw a figure showing different zones of stream pollution and discuss in detailed about zone of active decomposition. **[6]**

b) What are the natural forces acts for the purification for streams? **[6]**

c) Explain different treatment units in preliminary treatment of waste water. **[4]**

P.T.O.

<div align="center">OR</div>

Q4) a) A screen consisting of 10 mm diameter bars, at a clear spacing of 40 mm, treats a maximum hourly flow of 1275 m³, velocity of flow through screen chamber = 75 cm/sec. Work out : **[8]**

   i) Length and number of bars.
   ii) Head loss in the chamber.

b) What are the design considerations for a grit chamber. **[4]**

c) What is the difference between preliminary and primary treatment of wastewater? **[4]**

Q5) a) What is meant by activated sludge? Describe with sketch the treatment of the sewage by activated sludge process (ASP). **[6]**

b) Describe the advantages and disadvantages of ASP. **[6]**

c) Explain the following terms with respect to ASP. **[6]**

   i) Organic loading.
   ii) F/M ratio.
   iii) Volumetric loading.
   iv) HRT.
   v) MCRT.

<div align="center">OR</div>

Q6) a) What is the difference between high rate and low rate trickling filters?**[6]**

b) Explain with sketch the biological process in trickling filter. **[6]**

c) What are the advantages and disadvantages of trickling filter? **[6]**

<div align="center">**SECTION - II**</div>

Q7) a) Write in detail design parameters of aerated Iagoons and mention the advantages and disadvantages of the same. **[8]**

b) Distinguish clearly between the working of an oxidation ditch and oxidation pond. **[8]**

<div align="center">OR</div>

Q8) a) What are the advantages and disadvantages of oxidation ditch? **[8]**

b) What are the different methods of aerations in the treatment of aerated lagoons? **[8]**

Q9) a) Draw a neat sketch of septic tank (Plan & Elevation) and explain its working. **[6]**

b) Explain with sketch the method of septic tank effluent disposal. **[6]**

c) What are the suitable conditions and situations to propose septic tank unit for the sewage treatment. **[4]**

OR

Q10) a) Write the various design parameters of anaerobic digesters. **[6]**

b) What are the various gases generated in anaerobic digesters and their percentage? **[6]**

c) What are the different stages of digestion in case of anaerobic digesters? **[4]**

Q11) a) Explain equilization and proportioning. **[6]**

b) Discuss in brief various treatment processess adopted for treating industrial waste water. **[6]**

c) Draw a flowchart for treating sugar mill waste water. **[6]**

OR

Q12) a) Explain any one method of hazardous waste treatment. **[6]**

b) Explain the benefits of waste minimization. **[6]**

c) Explain in detail reactivity and toxicity in hazardous waste. **[6]**

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P516

[4064] - 8

B.E. (Civil)

STRUCTURAL DESIGN OF BRIDGES

(401005) (Elective - I) (2003 Course) (Sem. - I)

Time : 3 Hours]   *[Max. Marks :100*

Instructions to the candidates:

1)   *From Section I answer Q.1 or Q.2; Q.3 or Q.4 and from section II answer Q.5 or Q.6; Q.7 or Q.8.*

2)   *Answers to the two sections should be written in separate answer books.*

3)   *Figures in bold to the right indicate full marks.*

4)   *IS 456, IS 800, IS 1343 and steel table are allowed in the examination.*

5)   *Neat diagrams should be drawn wherever necessary.*

6)   *If necessary, assume suitable data and indicate clearly.*

7)   *Use of electronic pocket calculator is allowed.*

SECTION - I

Q1) a)   Explain the various loadings specified for highway bridges.   **[10]**

  b)   Derive the expression for economic span of a bridge.   **[10]**

  c)   What are the functions of bearings?   **[5]**

OR

Q2) a)   Explain how the loads on the longitudinal girders of a T-beam deck slab bridge are assessed.   **[10]**

  b)   Explain the different types of bearing used in R.C. bridges.   **[10]**

  c)   List the different types of loads considered in the design of a highway bridge.   **[5]**

Q3) An R.C. T-Beam deck slab bridge shown in Fig. 3 has the following details.**[25]**

  a)   Thickness of railings - 80 mm

  b)   Thickness of footpath - 150 mm

  c)   Thickness of wearing coat - 80 mm

  d)   Span of main girder - 20.0 m

  e)   Spacing of cross - beams - 2.5 m c/c

  f)   Live load - IRC Class AA tracked Vehicle.

  g)   Materials - M30 grade of concrete and Fe 415 grade of steel Adopt $m_1 = 0.075$ and $m_2 = 0.05$

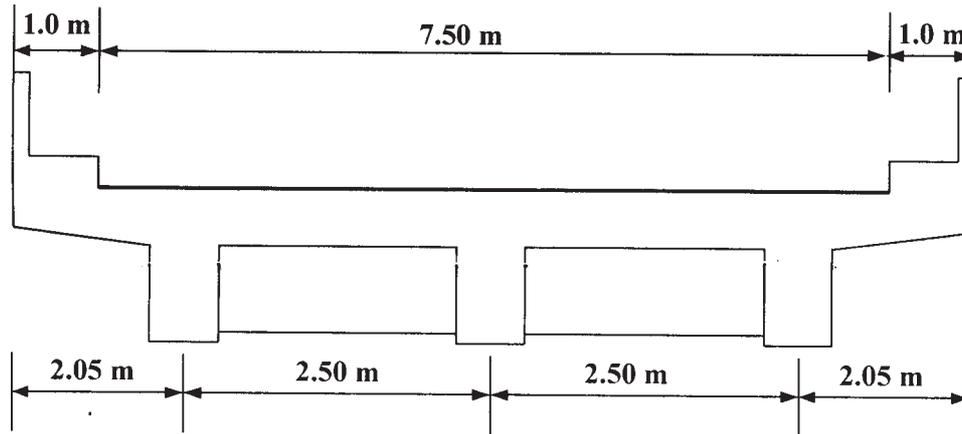 Design the deck slab and sketch the details of reinforcement.

Fig. 3

OR

Q4) For the R.C. T-Beam deck slab bridge given in Q.3, design the intermediate post-tensioned girder. Use M45 grade of concrete and high tension strands of 7 ply 15.2 mm diameter having an ultimate tensile strength of 1700 N/mm². Use Fe 415 steel for supplementary reinforcement. Consider loss ratio as 0.85. Sketch the details. **[25]**

SECTION - II

Q5) a) What are the advantages of steel bridges? **[10]**

b) Explain with neat sketches any five types of steel bridges. **[15]**

OR

Q6) a) Design a rocker and roller bearing for the given data and also sketch the details. **[18]**

i) Reaction from the girder = 2650 kN.

ii) Allowable pressure on bearings = 5 N / mm²

iii) Allowable pressure on bearing plate = 2600 N / mm²

iv) Allowable pressure on concrete bed = 6 N / mm²

b) Explain the procedure for design of an elastomeric pad bearing. **[7]**

Q7) Design the members $U_1 - U_1$, U_2L_1 and U_1-L_2 for the railway steel truss bridge shown in Fig. 7. Also draw a neat sketch of the connection of members at U_1.

   a)   Weight of stock rail - 0.67 kN / m

   b)   Weight of check rail - 0.47 kN / m

   c)   Timber sleepers of size - $(0.25 \times 0.25 \times 2.5)$ m @0.45 m c/c

   d)   Unit weight of timber - 7.7 kN / m³

   e)   Spacing of truss - 6.2 m c/c

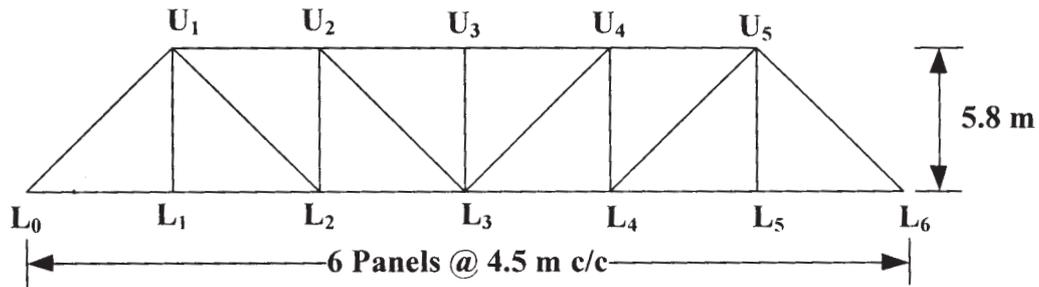   f)   The bridge supports a eudl of 2950 kN   **[25]**

Fig. 7

OR

Q8) For the railway bridge shown in Fig. 7, design the top and bottom lateral bracing with the given data.

The rails are 650 mm above the bottom chord. The chord memebrs are 450 mm deep and 500 mm wide. The end posts are 500 mm deep and 455 mm wide. The web members are 450 mm deep and 250 mm wide.   **[25]**

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P517   **[4064] - 10**

B.E. (Civil)

ADVANCED ENVIRONMENTAL MANAGEMENT

(Elective - I) (2003 Course) (Sem. - I) (401005)

Time : 3 Hours]   *[Max. Marks :100*

Instructions to the candidates:

    1)   *Answer any three questions from each section.*

    2)   *Answers to the two sections should be written in separate answer books.*

    3)   *Neat diagrams must be drawn wherever necessary.*

    4)   *Figures to the right indicate full marks.*

    5)   *Your answers will be valued as a whole.*

    6)   *Use of logarithmic tables, slide rule, electronic pocket calculator and steam table is allowed.*

    7)   *Assume suitable data, if necessary.*

SECTION - I

Q1) a) Write importance of environmental policy for smooth working of environmental management system.   **[9]**

     b) Define: **[9]**

        i)   Continual improvement.

        ii)   Environment.

        iii) Environmental Aspect.

OR

Q2) a) Enlist environmental management system principles and elements. **[6]**

     b) What are the advantages of ISO 14000 certification?   **[6]**

     c) Discuss scope of various 6 sub-committees under TC - 207.   **[6]**

Q3) a) Briefly discuss the salient features of Water (Prevention and control of Pollution) Act, 1974.   **[4]**

     b) What is the purpose of Air (Prevention & control) Act 1981; Explain in brief how this act helped the state pollution control board to control air pollution.   **[6]**

     c) Briefly discuss Municipal Solid Waste Rules 2000.   **[6]**

OR

Q4) a) State powers and functions of central board in **[6]**
      i) The Air Act.
      ii) The Water Act.
      iii) The Environmental Protection Act.
  b) Briefly discuss Hazardous Waste Management Handling Act 1989. **[6]**
  c) Explain procedure for sampling under **[4]**
      i) The Air Act.
      ii) The Water Act.

Q5) a) Write a procedure for controlling the emission of SOx by treatment of Sulphur from flue gas. **[6]**
  b) Explain the limestone injection process used to remove oxides of sulphur from flue gases. **[6]**
  c) Write the pollution indices in air monitoring and air quality assessment.**[4]**

<p align="center">OR</p>

Q6) a) Write National Ambient Air Quality (NAAQ) Standards for SPM, SOx, NOx & CO. **[4]**
  b) Enlist different control measures for NOx control and Explain any one in detail. **[6]**
  c) What are the sources of nitrogen oxides? Explain the following techniques to reduce the emission of NOx **[6]**
      i) Low excess air combustion.
      ii) Modifications in burner design.

<p align="center"><u>SECTION - II</u></p>

Q7) a) Discuss the suitable methods of collection & disposal of Municipal Solid Waste. **[6]**
  b) Write the classification of hazardous solid waste. **[6]**
  c) Explain with reference to hazardous waste. **[6]**
      i) Reactivity.
      ii) Corrosivity.
      iii) Toxicity.

<p align="center">OR</p>

Q8) a) Explain on-site handling, storage and processing of solid wastes. **[6]**
  b) What are the ill effects on environment because of improper disposal of biomedical waste? **[6]**
  c) Enlist different methods available for treatment of medical waste and discuss any one in detail. **[6]**

Q9) a) Write short notes on [12]
   i) Carbon adsorption.
   ii) Ion exchange.
   iii) Electrodialysis.
   b) What is advanced waste water treatment? Why it is necessary. [4]

<div align="center">OR</div>

*Q10)*a) Explain method of removal of phosphorous. [4]
   b) What is adsorption? Explain with a neat sketch granular Activated Carbon (GAC) treatment of effluent and regeneration of carbon. [6]
   c) What are the advantageous of removing nutrients from effluent? [6]

*Q11)*a) Discuss the role of general public in Environmental Clearance. [6]
   b) Write positive and negative environmental impacts of following projects of any one. [6]
   i) Thermal power plant.
   ii) Express highway.
   c) Explain the role of regulatory agencies and control board in Environmental Clearance of Project. [4]

<div align="center">OR</div>

*Q12)*a) Explain constructions 'Leopold Matrix' with reference to EIA. [4]
   b) What are advantages and disadvantages of EIA? [6]
   c) Explain procedure for public hearing in India. [6]

<div align="center">☞ ☞ ☞</div>

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[4064] - 13

B.E. (Civil)

EARTHQUAKE ENGINEERING

(Elective - II) (2003 Course) (Sem. - II) (401007)

Time : 3 Hours]   *[Max. Marks :100*

Instructions to the candidates:

1) *From Section I answer Q.1 or Q.2; Q.3 or Q.4; Q.5 or Q.6 and from Section II answer Q.7 or Q.8; Q.9 or Q.10; Q.11 or Q.12.*

2) *Answers to the two sections should be written in separate answer books.*

3) *Figures in bold to the right indicate full marks.*

4) *IS 456, IS 1893, IS 13920 are allowed in the examination.*

5) *Neat diagrams should be drawn wherever necessary.*

6) *If necessary, assume suitable data and indicate clearly.*

7) *Use of electronic pocket calculator is allowed.*

SECTION - I

Q1) a)   Explain elastic rebound theory.   **[10]**

b)   With a neat sketch explain the interior of the earth.   **[6]**
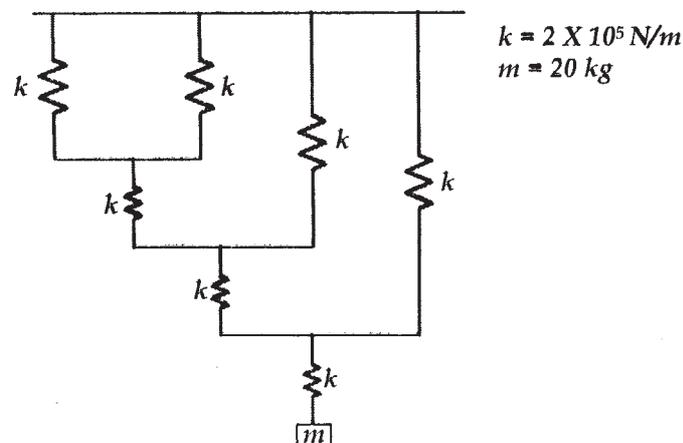
OR

Q2) a)   Explain the terms: epicenter, focal depth, epicentral distance.   **[6]**

b)   How are earthquakes measured? Explain in brief.   **[10]**

Q3) a)   Obtain the solution for a single degree of freedom system subjected to free damped vibrations.   **[10]**

b)   For the mathematical model shown in Fig. 3. b, determine the equivalent stiffness.   **[6]**

$k = 2 \times 10^5 \, N/m$
$m = 20 \, kg$

Fig. 3.b

Q4) a) For the system shown in Fig. 4.a, determine the natural frequency. Take
   m = 20 kg **[4]**

I = 1.6 X 10⁻⁵ m⁴
E = 200 X 10⁹ N / m²

6 X 10⁵ N/mm

2 X 10⁵ N/mm
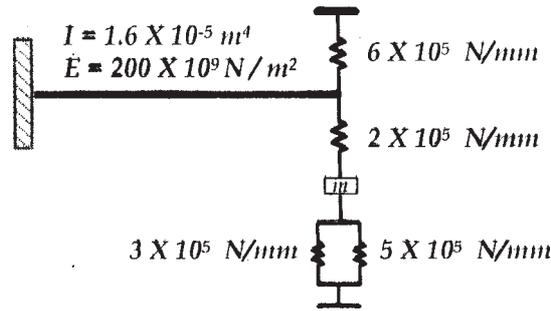
3 X 10⁵ N/mm   5 X 10⁵ N/mm

Fig. 4.a

b) Two identical masses that weight 675 N each rest on a frictional plane as
   shown in Fig. 4.b. They are connected by a spring with stiffness 36 N/
   m. Forces F are applied to pull the masses apart. Then the forces are
   suddenly released. Find the period and frequency of vibration. **[12]**


Fig. 4.b

Q5) a) What are shear walls? Explain with neat sketches. **[10]**

b) Explain the various structural arrangements by which the lateral loads on
   a structure can be resisted. **[8]**

OR

Q6) Fig. 6 shows plan of a 6-storey building located in zone III. Four shear walls
are provided in each direction to resist the seismic forces. The building has
the following data: **[18]**

a) Floor - to - floor height = 3.25 m

b) Dead load per unit area of floor = 3 kN/m²

c) Live load on each floor = 3 kN / m²

d) Live load on roof = 2.0 kN / m²

e) Axial load on each shear wall = 5500 kN

f) Size of columns = (350 × 350) mm

g) Soil below the foundation = Hard

h) Grade of materials = M 25 grade of concrete and Fe 415 grade of steel.

Design the shear walls.
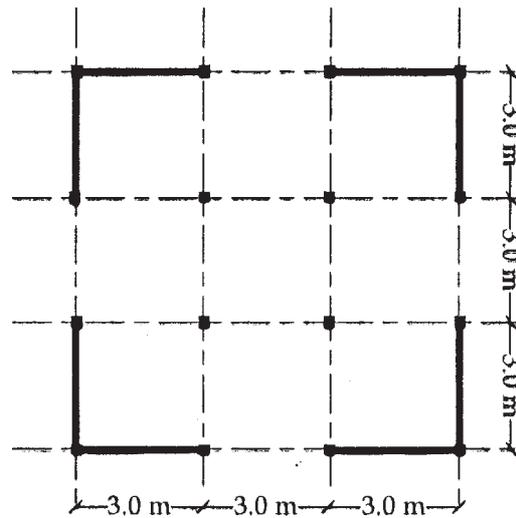
Plan

Fig. 6

SECTION - II

Q7) The G+3 building shown in Fig. 7 is located in seismic zone IV. The floor - to - floor height is 3.5m. The building is supported on hard strata. The R.C. frames are in - filled with masonry walls. The lumped weight due to dead loads is 8 kN /m² on floors and 5 kN/ m² on the roof. The floor slabs are designed for a live load of 3.5 kN/m² and the roof is designed 2 kN / m². Perform dynamic analysis along y - axis only. **[18]**
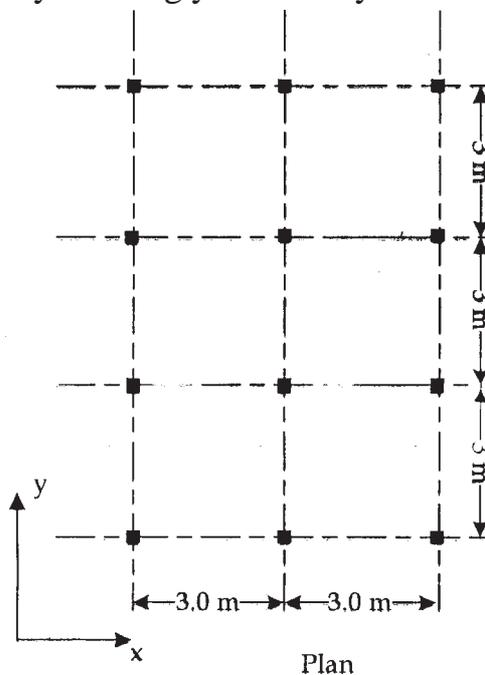
Plan

Fig. 7

Q8) a) Explain static analysis and dynamic analysis of structure for seismic loads. **[9]**

b) Explain the phenomenon of liquefaction. **[9]**

Q9) A (230 × 350) mm column is reinforced with 8-16#. It is supported on an isolated footing. The load coming on the footing is 950 kN and a moment of 25 kNm. The SBC of the soil is 200 kN/m². Using M20 grade of concrete and steel of grade Fe 415, design the footing and sketch the details of reinforcement. **[16]**

OR

Q10) What is retrofitting and rehabilitation of structures? **[16]**

Q11) Explain the various techniques of retrofitting. **[16]**

OR

Q12) a) Explain the factors to be considered before retrofitting? **[8]**

b) Explain active, passive and hybrid protective systems. **[8]**

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[4064] - 16

B.E. (Civil)

CONSTRUCTION MANAGEMENT

(Elective - II) (2003 Course) (Sem. - II) (401007)

Time : 3 Hours]   *[Max. Marks :100*

Instructions to the candidates:

1) *Question Nos. 1 and 6 are compulsory. Out of the remaining attempt 2 questions from Section I and 2 questions from Section II.*

2) *Answers to the two sections should be written in separate books.*

3) *Neat diagrams must be drawn wherever necessary.*

4) *Use of logarithmic tables, slide rule, Mollier charts, electronic pocket calculators and steam tables is allowed.*

5) *Assume suitable data, if necessary.*

SECTION - I

Q1) a) Discuss the importance of communication and coordination between client, consultant and contractor for a construction site. Explain with suitable examples. **[10]**

b) What are the qualities required for a successful construction manager? Out of these qualities, list any four most important stating the reasons.**[8]**

Q2) a) Differentiate between ABC analysis and Music 3D rule with example.**[8]**

b) Explain the procedure adopted on any construction site from the raising of demand slip till the requirement is fulfilled. (Assume that stock is not available and material to be ordered). **[8]**

OR

Q3) a) Explain 4 Ms of construction stating its inter - dependability. **[8]**

b) Explain Just in Time method in detail. Discuss whether we can use JIT for construction sites giving reasons. **[8]**

Q4) a) Explain following appraisal techniques. **[8]**
- Benefit cost analysis.
- Break even analysis.

State applications of each.

b) What is annuity? What are different types of annuity? Give applications of each. **[8]**

OR

P.T.O

Q5) a) Give the rating method as suggested by ICRA for a construction company.

[10]

b) Foreign Direct Investment (FDI) is playing a major role in infrastructure development in India. State your views on the same. **[6]**

SECTION - II

Q6) a) Suggest suitable rehabilitation plan for a city struck very badly by earthquake. **[8]**

b) Write a detailed note on Disaster Management w.r.t. following points.**[10]**
- Definition of disaster
- Types of disasters
- Disaster Preparedness
- Mitigation
- On site and off site planning

Q7) a) Give the points covered under the training programme of a safety engineer.

[8]

b) Explain in detail the "Child labour act" **[8]**

OR

Q8) a) What are the benefits of training? Describe various types of training programmes and its applications. **[8]**

b) Give the points covered in maternity leave act. **[8]**

Q9) a) Write a detailed note on CIDC. **[8]**

b) What are the advantages of using computer as MIS tool? **[8]**

OR

*Q10)*a) Describe various methods of Construction risk mitigation. **[8]**

b) What is the necessity of MIS on construction site. **[8]**

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[4064] - 18

B.E. (Civil)

ADVANCED ENGINEERING GEOLOGY WITH ROCK MECHANICS

(Elective - II) (2003 Course) (Sem. - II) (401007)

Time : 3 Hours]   *[Max. Marks :100*

Instructions to the candidates:

 1)   *Answers to the two sections should be written in two separate books.*

 2)   *Figures to the right indicate full marks.*

 3)   *All questions are compulsory.*

 4)   *Neat diagrams must be drawn wherever necessary.*

SECTION - I

Q1) a)   Explain Engineering significance of archean rocks in Maharashtra State.**[8]**

 b)   Describe Flow groups of basalta.   **[6]**

 c)   Write notes Pinching and bulging of Dykes.   **[4]**

OR

Explain:

 a)   Engineering significance of Precambrian secondary rocks in Maharashtra State.   **[8]**

 b)   Varieties of Basalts.   **[6]**

 c)   Field characters of fractures.   **[4]**

Q2) a)   Mention in detail any two case histories of dams in which economy has been achieved by interpreting correctly the geological conditions in Deccan trap area.   **[8]**

 b)   Discuss in detail the relation between location of spillway and local geology in deccan trap area.   **[8]**

OR

Write in brief on

 a)   Engineering significance of fractures from dam foundation point of view.   **[8]**

 b)   Engineering significance and origin of Tachylytic basalts.   **[8]**

Q3) a) <u>List only</u> various physical properties of rock masses. **[3]**

b) Describe Compressive strengths and Shear strengths of rock masses.**[8]**

c) Write in detail on 'Q' System of classification of rock masses. **[5]**

OR

a) Explain the procedure of Electrical resistivity method. **[3]**

b) Explain Bieniawskis's geomechanical classification rock masses. **[8]**

c) Describe any two physical properties of rock masses. **[5]**

SECTION - II

Q4) a) How Location and depth of drill holes to be taken for bridge pier foundation is decided. **[6]**

b) Discuss Tunneling through deccan trap basalts with suitable examples. **[12]**

OR

a) What treatment is to be given to a dyke occurring below the foundation of bridge pier. **[6]**

b) What problems arise when tunnel is associated with dyke / dykes. **[6]**

c) Describe Tunneling through Amygdaloidal Basalts with examples. **[6]**

Q5) Give detailed account of water bearing characters of Deccan trap basalt rocks. **[16]**

OR

Write notes on:

a) Deep drilled wells. **[4]**

b) Scarcity of sand in deccan trap area. **[4]**

c) Characters and engineering significance of older alluvium. **[8]**

Q6) Write notes on:

a) Problems with made ground in cities. **[4]**

b) Giant phenocryst basalt as a construction material. **[4]**

c) Engineering significance of fault / faults in major civil engineering works as dams and tunnels. **[8]**

OR

a) Foundation of monumental buildings. **[4]**

b) Use of dyke a rock as a construction material. **[4]**

c) R.I.S. in Deccan trap area. **[8]**

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[4064]-30

B.E. (Mechanical Engineering) (S/W)
COSTING AND COST CONTROL
(2003 Course) (Elective - I) (402045) (Sem. - I)

Time : 3 Hours] [*Max. Marks : 100*

Instructions to the candidates:

    1) *Answer any one question from each unit.*

    2) *Answers to the two sections should be written in separate books.*

    3) *Neat diagrams must be drawn wherever necessary.*

    4) *Figures to the right indicate full marks.*

    5) *Use of electronic pocket calculator is allowed.*

    6) *Assume suitable data, if necessary.*

SECTION - I

Unit - I

Q1) a) What is cost accounting? What are its objectives? How do cost accounting records help in the planning and control of operations of business enterprise? **[12]**

    b) What are the limitations of financial accounting? **[4]**

OR

Q2) a) Distinguish between *Financial Statement Analysis* and *Funds Flow Analysis* with an example? **[4]**

    b) Explain the various elements of cost with an example for each? **[12]**

Unit - II

Q3) a) Distinguish between the following with an example for each : **[8]**

      i) Controllable cost and Non-controllable cost.

      ii) Direct and indirect costs.

    b) Distinguish between management accounting and financial accounting? Also explain the role of management accountant? **[10]**

OR

Q4) a) Distinguish between the following : **[8]**

      i) Cost control and Cost reduction.

      ii) Direct and Indirect labor cost.

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b) A company present the following data for the month of April 2009. Direct labor cost Rs.17500 being 175% of works overheads Cost of goods sold excluding administrative expenses Rs.50000 Inventory accounts showed the following opening and closing balances : **[10]**

	April 1	April 30
Raw materials	Rs.8000	Rs.10000
Work-in-progress	10500	14500
Finished goods	17600	19000

Other data are :

Selling expenses	Rs.3500
General and administrative expenses	2500
Sales for the month	75000

Compute the value of materials purchased

Unit - III

Q5) a) What do you understand by classification, allocation and apportionment in relation to overhead expenses? Explain. **[12]**

b) Explain the term 'material cost variance'? **[4]**

OR

Q6) a) Define 'budget' and 'budgetary control'. Discuss the objectives and limitations of budgetary control? **[10]**

b) Discuss the secondary distribution of overheads. **[6]**

SECTION - II

Unit - IV

Q7) a) Define and explain the term "joint products and by-products". Enumerate the method which may be employed in costing 'joint product'? **[9]**

b) Explain the procedure of accounting for by-products? **[9]**

OR

Q8) a) Discuss the distinguishing features of a process cost system? **[9]**

b) Prepare process cost accounts from the following data: Production overhead incurred is Rs.160,000 and is recovered on 200% of direct wages. Production during the period was 20,000 units. There was no opening and closing work-in-progress. **[9]**

Items	Total	Process		
		I	II	III
Direct material	4,40,000	3,60,000	60,000	20,000
Direct wages	80,000	20,000	40,000	20,000
Direct expenses	1,00,000	60,000	--	40,000

Q9) a) Discuss the uses and assumptions of CVP analysis. Explain its significance to management? **[8]**

b) The ratio of variable cost to sales is 70%. The break even point occurs at 60% of the capacity sales. Find the capacity sales when fixed costs are Rs.90000. **[8]**

OR

Q10) a) How do the following reflect on a break even point. **[10]**

i) Increase in total fixed cost.
ii) Decrease in variable cost per unit.
iii) Increase in total physical sales.

b) Discuss the following terms in relation to marginal costing : **[6]**

i) P/V ratio.
ii) Key factor.
iii) Margin of safety.

Unit - VI

Q11) a) What is Activity-Based Costing? Why is it needed? **[6]**

b) Define and explain the concepts of standard cost and standard costing? Comment on the statement 'Standard costs are bases for a proper managerial control manufacturing operations'. **[10]**

OR

Q12) a) Explain different types of standards used in standard costing. What are the advantages and limitations of standard costing? **[9]**

b) What do you mean by marginal costing? Discuss its usefulness and limitations? **[7]**

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[4064]-92

B.E. (Electrical)
DIGITAL CONTROL SYSTEMS
(2003 Revised Course) (Sem. - II) (403149)

Time : 3 Hours]   *[Max. Marks : 100*

Instructions to the candidates:

1) *Answer any one question from each pair of questions Q.1 & Q.2, Q.3 & Q.4, Q.5 & Q.6, Q.7 & Q.8, Q.9 & Q.10 and Q.11 & Q.12.*
2) *Answers to the two sections should be written in separate books.*
3) *Neat diagrams must be drawn wherever necessary.*
4) *Figures to the right indicate full marks.*
5) *Use of logarithmic tables slide rule, electronic unprogrammable pocket calculator is allowed.*
6) *Assume suitable data, if necessary.*

SECTION - I

Q1) a) Draw a block diagram of Basic Digital Control System and explain function of each block. **[8]**

     b) Check whether the following systems are static or dynamic, Linear or non-linear, causal or noncausal, Time varient or time invarient : **[8]**
         i) $Y(n) = Cos[x(n)]$
         ii) $Y(n) = x(-n+2)$

OR

Q2) a) Explain the sampling and reconstruction process. State sampling theorem & give its importance. **[6]**

     b) Explain with neat diagrams & mathematical expression, standard discrete Input test signals. **[5]**

     c) Compare Digital Control Systems with Analog Control Systems. **[5]**

Q3) a) Draw a neat block diagram of Digital Position Control Scheme and explain function of each block. **[8]**

     b) Discuss various methods of obtaining the convolution of discrete time system. **[8]**

OR

Q4) a) What do you understand by Direct Form-I and Direct Form-II structure representations of a discrete time system? Explain it with neat diagrams. **[8]**

b) Compute linear convolution of following sequences using mathematical equation of convolution. Also verify the result by Tabulation method. **[8]**

$X(n) = \{\underset{\uparrow}{1}\}$ *and* $h(n) = \{\underset{\uparrow}{2}, 1, 2, 1\}$

Q5) a) Explain any two methods of obtaining inverse Z-transform. **[6]**

b) i) If $X(Z) = \dfrac{Z^2}{Z^2 - 1.2Z + 0.2}$, Then first obtain X(n) by partial fraction method and then find the values of X(0) and X(∞). **[12]**

ii) Use Residue method to obtain $x(n)$ for repeated poles of the,

$$X(Z) = \frac{Z(Z+1)}{(Z-1)^2}$$

OR

Q6) a) State and prove Initial value theorem and Final value theorem in discrete time systems. **[6]**

b) Find the Z-transform of following sequences: **[12]**
   i) $f(t) = e^{-at} . \sin wt$.
   ii) $X(n) = [3(4n) - 5(3n)] u(n)$ by linearity property.

SECTION - II

Q7) a) Explain Jury's stability test for discrete data system. By applying Jury's Test investigate the stability of the discrete data system represented by the characteristic polynomial **[10]**

$F(Z) = Z^4 - 1.5Z^3 + 0.3Z^2 + 0.07Z + 0.05$

b) Explain the method of Bilinear transformation coupled with Routh's stability criterion for the determination of the stability of discrete-data system. **[6]**

OR

Q8) a) Define 'Pulse Transfer Function'. Derive pulse transfer function for error sampled unity feedback control system with open loop transfer function G(S). **[6]**

b) A certain unity feedback error sampled data control system has $G(S) = \dfrac{S}{S(S+2)}$ and sampling period T = 1 sec. For unit step input, determine : **[10]**
   i) The Z-transform of the output C(Z).
   ii) The o/p response at sampling instants.

Q9) a) A discrete time system is described by state space model :

$$x(k+1) = \begin{bmatrix} -1 & 0 \\ 1 & -1 \end{bmatrix} x(k) + \begin{bmatrix} 1 \\ 0 \end{bmatrix} u(k) \quad y(k) = [11]x(k)$$

Determine the z-transfer function of the system. **[8]**

b) Draw the state variable diagram in phase variable companion form and determine the discrete time state variable model using direct decomposition method for a system have pulse transfer function. **[8]**

$$\frac{Y(z)}{U(z)} = \frac{3z^2 - 2z + 6}{z^3 + 0.5z^2 - 0.3z + 0.8}$$

OR

Q10) a) Define and explain the state transition matrix. Explain any one method of determining the state transition matrix. **[6]**

b) The discrete time control system is represented by state equation

$$x(k+1) = \begin{bmatrix} 0 & -0.2 \\ 1 & -1 \end{bmatrix} x(k) + \begin{bmatrix} 1 \\ 1 \end{bmatrix} u(k)$$

Find the state transition matrix $\phi(t)$ & sol^n. of state eq^n. $x(k)$. **[10]**

Q11) a) Define and explain the concept of controllability & observability of a discrete time control system. What are the different tests for determining the controllability & observability? **[8]**

b) Investigate the controllability and observability of a discrete time control system represented by the State space model.

$$x(k+1) = \begin{bmatrix} 1 & 1 \\ -2 & -1 \end{bmatrix} x(k) + \begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix} u(k); \ y(k) = \begin{bmatrix} 0.5 & 0 \\ 0 & 0.5 \end{bmatrix} x(k)$$ **[10]**

OR

Q12) a) Define eigen values and eigen vectors of discrete data system and determine the same for the discrete data system represented in state space form. **[8]**

$$x(k+1) = \begin{bmatrix} 0.8 & 0 \\ 1 & 0.5 \end{bmatrix} x(k) + \begin{bmatrix} 0.5 \\ 1 \end{bmatrix} u(k)$$

$$Y(k) = [1 \ 1] x(k)$$

b) Derive the transfer function of a digital phase-log compensating network. **[4]**

c) Draw neat block diagram and explain the working of digital PID controller. How to choose constants of PID controller. **[6]**

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[4064]-96

B.E. (Electrical)

ANN & IT'S APPLICATION IN ELECTRICAL ENGINEERING
(2003 Course) (403150) (Elective -II) (Sem. - II)

Time : 3 Hours]   *[Max. Marks : 100*

Instructions to the candidates:

1) *Answers to the two sections should be written in separate books.*
2) *Neat diagrams must be drawn wherever necessary.*
3) *Figures to the right indicate full marks.*
4) *Your answers will be valued as a whole.*
5) *Assume suitable data, if necessary.*

SECTION - I

Q1) a) Explain with neat sketch Single Layer Artificial Neural Network. **[8]**

   b) How ANN is inspired through Human brain. **[8]**

OR

Q2) a) What is Artificial Intelligence? Hence explain ANN Fuzzy system and knowledge based system. **[8]**

   b) Enlist typical nonlinear activation operators with their type, equation and functional form. **[8]**

Q3) a) What are the different learning tasks. **[8]**

   b) Explain in detail Hebbian Network. **[8]**

OR

Q4) a) Explain supervised learning with example. **[8]**

   b) Explain hidden layer and it's Functions. **[8]**

Q5) a) Explain in detail about learning rate Annealing. **[8]**

   b) Draw a structure of MLP and explain with input, hidden and output layer. **[10]**

OR

Q6) a) What is multi Layer Perceptron. Explain in detail. **[8]**

b) What do you mean by fuel forward N/N? **[8]**

c) For $p = \begin{bmatrix} 1 & 0.2 & 0.5 \end{bmatrix}^T$; $w = \begin{bmatrix} 1 & 0.5 & 1 \\ 0.5 & 1 & 1 \\ 2 & 1 & 1 \end{bmatrix}$; $b = \begin{bmatrix} 1 & 1 & 1 \end{bmatrix}^T$ **[2]**

Find activation function for purelin T.F.

SECTION - II

Q7) a) Explain in detail Delta Rule. **[8]**

b) Draw and explain Simple ADALINE network. **[8]**

OR

Q8) a) Write an algorithm for generalized classification problem for Perceptron method. **[8]**

b) Explain Back-propagation in detail. **[8]**

Q9) a) Write Energy function for BAM. **[6]**

b) What is vector Quantization. **[6]**

c) Explain classical ART Networks. **[6]**

OR

Q10) a) Explain in detail Recurrent Network. **[9]**

b) Explain in detail Hopfield Network. **[9]**

Q11) Apply ANN for load forecausting problem. **[16]**

OR

Q12) Use Back propagation to learn and train Neural Network for reactive power dispatch program. **[16]**

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[4064]-124

B.E. (E & TC)

VLSI DESIGN

(2003 Pattern) (404217) (Sem. - I)

Time : 3 Hours] *[Max. Marks : 100*

Instructions to the candidates:

1) *Answer any three questions from each section.*
2) *Answers to the two sections should be written in separate books.*
3) *Neat diagrams must be drawn wherever necessary.*
4) *Figures to the right indicate full marks.*

SECTION - I

Q1) a) Write VHDL code for 3-bit up-down counter. Include function to return seven segment value to main program using BCD from it. **[8]**

b) Explain role of different attributes in VHDL. **[4]**

c) Differentiate function and procedure. **[6]**

OR

Q2) a) Write VHDL code for 4 × 8 RAM. Also write test bench for it. **[8]**

b) What do you mean by operator overloading? How it is useful while programming? **[4]**

c) Write VHDL code for 4:1 multiplexer using 2:1 multiplexer as a component. **[6]**

Q3) a) Design coffee vending machine using FSM. The sequence to be followed as stated below : **[10]**

   i)   Machine senses coin.
   ii) It accepts tea input tea/coffee as an option for customer.
   iii) Pours tea/coffee for 10 sec.
   iv) Gives an alarm for 2 sec.
   v)   Waits for next coin.

b) Compare Melay and Moore machines with suitable examples. **[6]**

OR

Q4) a) Draw FSM and write code for JK Flip Flop. **[6]**

b) With FSM diagram presentation, write VHDL code for Traffic light controller. Include 'Night Blinker Mode' in the code. **[10]**

Q5) a) Compare between CPLD and FPGA. How they differ from ASICs? **[8]**

b) Explain with block schematic, the architecture of FPGA. **[8]**

OR

Q6) a) Explain architecture of CPLD w.r.t : **[8]**
   i)   Microcell
   ii) CLB
   iii) I/O banks
   iv) Memory banks

b) Differentiate between logic implementation by CPLD and FPGA. What are the limitations while logic implementation using them. **[8]**

SECTION - II

Q7) a) Define and explain importance of integrity and EMI. **[9]**

b) Explain the use of multiple clocking and significance of grounding techniques in SOC. **[9]**

OR

Q8) a) Discuss clock distribution techniques pertaining to SOC. **[9]**

b) What is clock jitter? How glitches can be removed? **[9]**

Q9) a) Implement the EXOR function using CMOS. Also calculate area in terms of width of MOSFET. **[8]**

b) What do you mean by technology scaling? What are the limitations of scaling? **[8]**

OR

Q10) a) Explain with neat diagrams, CMOS layout design rules with respect to maximum and minimum size spacing for (i) n-well (ii) poly (iii) metal (iv) active area. **[8]**

b) Write short note on Static, Dynamic and short circuit power dissipation in CMOS inverter. **[8]**

Q11) a)   Explain stuck- at- 0 and stuck-at-1 fault.   **[8]**

b)   Write short note on :   **[8]**
   i)   BIST
   ii)   Boundary scan.

<div align="center">OR</div>

Q12) a)   Define and explain Design for Testability (DFT) and fault coverage. **[8]**

b)   What is JTAG? Explain the functions of TDI, TCK, TMS, TDO, and TRST.   **[8]**

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P530

[4064]-142

B.E. (Instrumentation & Control)
PROJECT ENGINEERING AND MANAGEMENT
(1997 & 2003 Course) (Sem. - I) (406262)

Time : 3 Hours]   *[Max. Marks : 100*

Instructions to the candidates:

1) *Answers to the two sections should be written in separate books.*
2) *Neat diagrams must be drawn wherever necessary.*
3) *Figures to the right indicate full marks.*
4) *Assume suitable data, if necessary.*
5) *All questions are compulsory.*

SECTION - I

Q1) a) Draw ISA symbols used in P & ID diagram.   **[10]**
   i)   Two way valve fail close.
   ii)   Vacuum Relief valve.
   iii) Pressure Reducing regulator with external tap.
   iv)   Level Regulator with mechanical linkage.
   v)   Flow Element in line.

   b) State the chronological steps in development of Project Engineering Document.   **[6]**

OR

Q2) a) Draw ISA symbols used in P & ID diagram.   **[10]**
   i)   Pneumatic signal line.
   ii)   Ultrasonic guided signal..
   iii) Shared signal from field to control Room.
   iv)   Bias.
   v)   High selector & High Limiter (SAMA) Symbol.

   b) List & explain different categories of the Project.   **[6]**

Q3) a) Draw the Temperature Control Loop. Give naming convections for **[4]**
   i)   The Loop.   **[2]**
   ii)   The instruments as per ISA.   **[2]**

   b) Prepare an Instrument Index Sheet for the Loop Drawn in Q.No.3a. **[4]**

   c) Prepare the Specification Sheet in S-20 format for Thermocouple. **[6]**

Q4) a) Explain the loop wiring diagram in Project Engineering. Support your answer with two examples. **[10]**

   b) Draw the level Control Loop. Give naming convections for **[4]**

   i) The Loop. **[2]**

   ii) The instruments as per ISA. **[2]**

Q5) a) What are different types of Cables used in Plant instrumentation? Suggest suitable cables for Analog Signal & Data Signal. Justify your selection.**[8]**

   b) What is IOI? Explain the term networking with respect to IOI. **[8]**

OR

Q6) a) Prepare BOM for the Temperature Transmitter. **[8]**

   b) Explain the importance of Plant Layout & GA drawings for Instrument Project Engineering. **[8]**

SECTION - II

Q7) a) Enlist & explain in brief the documents required for commissioning activity. **[8]**

   b) Explain the Vendor Registration process. State its need. **[8]**

OR

Q8) a) What are the key points required to be considered while issuing the PO to the supplier. **[8]**

   b) Prepare CAT for any Control Panel. **[8]**

Q9) a) Prepare Typical Inspection report for the Control Panel. **[9]**

   b) Write short note on CPM & PERT? **[9]**

OR

Q10) a) Draw & explain the Control Room layout with certain considerations. **[9]**

   b) Draw & explain the Installation of DP transmitter. **[9]**

Q11) Write brief notes on : **[16]**

   a) WBS

   b) Crash Time Concept

   c) SOW

   d) Project Estimates.

Q12) a) Explain the following Standards in brief. **[8]**

       i)   ISA

      ii)   API

     iii) SAMA

     iv) NEMA

    b) Explain 'Gant Chart' in detail. **[8]**

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P531   **[4064]-145**

B.E. (Instrumentation & Control)
INSTRUMENTATION FOR ENVIRONMENTAL ENGINEERING
(2003 Course) (Elective -I) (406264) (Sem. - I)

Time : 3 Hours]   *[Max. Marks : 100*

Instructions to the candidates:

1) *Attempt any 3 questions from each section.*
2) *Figures to the right indicate full marks.*
3) *Programmable calculators are not allowed.*
4) *Neat diagrams must be drawn wherever necessary.*
5) *Assume suitable data, if necessary.*

SECTION - I

Q1) a) Explain partition chromatographic analysis in detail. **[8]**

b) Enlist spectroscopic methods of pollution analysis. **[10]**

OR

Q2) a) Differentiate between offline and online measurements of pollutants.**[10]**

b) Explain Volumetric methods of qualitative analysis of pollution. **[8]**

Q3) a) Explain dry cold Environmental Testing. **[8]**

b) Write a note on ISO 14000 standard. **[8]**

OR

Q4) a) What is Threshold Limiting Value (TLV). Explain Biological Sampling & their measurements. **[8]**

b) Discuss on salt spray environmental testing. **[8]**

Q5) a) A conventional cyclone with diameter 2 meter handles 3.0 m^3/s of standard air carrying particles with a density of 3000 kg/m^3 for effective number of turns of a gas makes in tranversing the cyclone (Ne) is 6. Determine the cutsize & the efficiency as a function of particle diameter. **[8]**

b) What is collection efficiency? Explain mechanisms of particulate control equipments. **[8]**

OR

Q6) a) Explain instrumentation setup for Air pollution analysis. **[10]**

b) Discuss on Heating, Ventilation and air conditioning controls. **[6]**

SECTION - II

Q7) Explain various primary, secondary and tertiary treatments of domestic effluents. Explain controls of activated sludge process. **[18]**

OR

Q8) Explain different water quality monitoring instruments. Comment on recommended water quality instruments. **[18]**

Q9) a) Write short notes on (any three) : **[8]**
   i) Effect of noise on health.
   ii) Noise measurements.
   iii) Acid rain.
   iv) Effects of radiations.

b) Suggest suitable method to control radioactive pollution. **[8]**

OR

Q10) a) What is noise mapping? Suggest setup for automobile noise measurement & control. **[8]**

b) List suitable sensors for detecting radioactivity. Describe working of a system which monitors radioactivity. **[8]**

Q11) a) Suggest suitable instrumentation for soil pollution reduction. **[8]**

b) Explain trace element analysis in soil. **[8]**

OR

Q12) Write short notes on : **[16]**
   a) Analysis of chromatographic characterization of pollution.
   b) Path of pesticides in environment.
   c) Analysis of micronutrients.

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[4064]-149

B.E. (Instrumentation & Control)
PROCESS INSTRUMENTATION - II
(2003 Course) (Sem. - II) (406267)

Time : 3 Hours]   *[Max. Marks : 100*

Instructions to the candidates:

   1)   Answers to the two sections should be written in separate books.
   2)   Neat diagrams must be drawn wherever necessary.
   3)   Figures to the right indicate full marks.
   4)   Your answers will be valued as a whole.

SECTION - I

Q1) a) Which basic components are required in the refrigeration cycle?   **[4]**

   b) Draw the diagram for above showing those components.   **[4]**

   c) Draw the pressure-enthalpy chart.   **[4]**

   d) What is coefficient of performance? Write equation/formula.   **[4]**

   e) State the unit in which capacity of chiller is expressed.   **[2]**

OR

Q2) a) Enlist different types of heat exchangers.   **[4]**

   b) Explain with neat instrumentation diagram difference between feedback
       and feed forward control of heat exchangers.   **[8]**

   c) How cascade control is implemented in heat exchanger?   **[6]**

Q3) a) Enlist different types of chemical reactors.   **[6]**

   b) In a CSTR (exhothermic) which components contribute time lags? How
       split ranging control is applicable in this case? Explain.   **[10]**

OR

Q4) How Reactor Safety can be assured? Explain in details.   **[16]**

Q5) a) Which important parameters are required to specify a Boiler Feed pump?
       Enlist them.   **[10]**

   b) Explain any one type of pump control instrumentation.   **[6]**

Q6) a) Enlist types of compressors. **[4]**

b) Give specifications of a typical compressor. **[10]**

c) Which tuning method will be preferred in surge control of compressor? Name it. **[2]**

SECTION - II

Q7) a) How air fuel ratio control is implemented in Boiler (assume Thermal plant)? How mass of fuel is decided? How the ratio is calculated - (i.e. how much air is required to burn 1 kg. of fuel)? Explain in detail. **[12]**

b) State sensors used in above. **[6]**

OR

Q8) Enlist important controls in Boiler Instrumentation. Explain any two of them (except ratio control) in details. **[18]**

Q9) Which important loops are there that take care of a distillation column process control; enlist. Explain any two of them. **[16]**

OR

Q10) a) Assume that five C-M pairs for Distillation column process control are available. How RGA is applicable to select best one; explain. **[10]**

b) How many probable C-M pairs are available in 5 C-M pairs (5 CVs and 5 MVs)? **[6]**

Q11) Explain Evaporator instrumentation in general. **[16]**

OR

Q12) Explain Dryer instrumentation in general. **[16]**

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[4064]-190

B.E. (Chemical)
ADVANCED SEPARATION PROCESSES
(409341) (2003 Course) (Elective - I) (Sem. - I)

Time : 3 Hours]   *[Max. Marks : 100*

Instructions to the candidates:

1) *Answer three questions from Section I and three questions from Section II.*
2) *Answers to the two sections should be written in separate books.*
3) *Neat diagrams must be drawn wherever necessary.*
4) *Assume suitable data, if necessary.*

SECTION - I

Q1) a) Give the classification of chromatography process. **[6]**

    b) Give the details of chromatographic column design and filling. **[6]**

    c) Explain in detail 'Temperature swing adsorption. **[6]**

OR

Q2) a) Explain the basic concept of liquid chromatography process. **[6]**

    b) Explain the characteristics of solids to be used in adsorption separation methods. **[6]**

    c) Explain the methods of development of chromatographic separation.**[6]**

Q3) a) State advantages of membrane separation processes over conventional processes. **[8]**

    b) Explain pervaporation process with schematic diagram. **[8]**

OR

Q4) a) State application of MF, UF and RO processes. **[8]**

    b) Explain in detail the 'Membrane configuration'. **[8]**

Q5) a) Explain reactive extraction in detail. **[8]**

    b) State advantages of reactive separation methods over conventional methods. **[8]**

OR

Q6) a) What is the reactive distillation? Explain in detail. **[8]**

b) Explain the term 'reactive crystallization'. **[8]**

SECTION - II

Q7) a) Give the adsorption properties of foam. **[6]**

b) Explain the Froth Flotation Process. **[6]**

c) Explain collapse and drainage phenomena. **[6]**

OR

Q8) a) Describe the ring over technology used for separation. **[6]**

b) Give the design of Flotation equipment. **[6]**

c) Explain foam formation technique. **[6]**

Q9) Discuss in details of **[16]**

a) Molecular sieves.

b) Aductive crystallization.

OR

Q10) Explain in details of **[16]**

a) Zone Refining.

b) Zone Electrophoresis.

Q11) Explain the following : **[16]**

a) Ultra centrifugation.

b) Recoil method.

OR

Q12) Write short notes on the following : **[16]**

a) Use of exchange reactions for separations.

b) Factors for selection of separation process.

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[**4064]-194**

B.E. (Chemical)

PROCESS MODELING & SIMULATION

(2003 Course) (Sem. - II) (409351)

Time : 3 Hours] [*Max. Marks : 100*

Instructions to the candidates:

    1)   *Answer any three questions from each section.*

    2)   *Answers to the two sections should be written in separate books.*

    3)   *Neat diagrams must be drawn wherever necessary.*

    4)   *Figures to the right indicate full marks.*

    5)   *Use of logarithmic tables slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.*

    6)   *Assume suitable data, if necessary.*

SECTION - I

Q1) a)   Draw the flow chart of a systematic approach to process modeling & list in point form the key issues for each major modeling task.   **[8]**

    b)   Discuss the classification of the categories of equations in process model.   **[8]**

OR

Q2) a)   What is process model? What points should be considered to form the model?   **[8]**

    b)   Give the classification of model. What is the difference between linear and nonlinear model? Explain with suitable examples.   **[8]**

Q3) A component material balance around a chemical reactor yields the following steady state equation.

$$O = \frac{F}{V}C_{in} - \frac{F}{V}C - KC^3$$

where $\dfrac{F}{V}$ = 0.1 min $^{-1}$, C_{in} = 1.0 Kg mol/m^3, K = 0.05 m^6 / Kg mol^2.min.

    a)   How many steady state solutions are there?

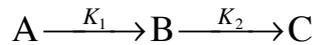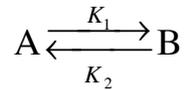   b)   Write two different direct substitution methods and assess the convergence of each.   **[16]**

OR

Q4) Write the component continuity equations describing the CSTR with **[16]**

a) Simultaneous reactions (first order, isothermal)

$$A \xrightarrow{K_1} B \xrightarrow{K_2} C$$

b) Reversible (first order, isothermal)

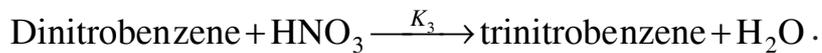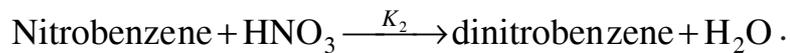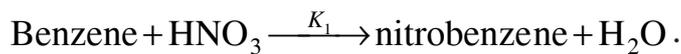$$A \underset{K_2}{\overset{K_1}{\rightleftharpoons}} B$$

c) Write the component continuity equations for a perfectly mixed batch reactor (no inflow or outflow) with first order isothermal reactions.

i) Consecutive.

ii) Simultaneous.

Q5) Benzene is nitrated in an isothermal CSTR in three sequential irreversible reactions.

$$\text{Benzene} + HNO_3 \xrightarrow{K_1} \text{nitrobenzene} + H_2O .$$

$$\text{Nitrobenzene} + HNO_3 \xrightarrow{K_2} \text{dinitrobenzene} + H_2O .$$

$$\text{Dinitrobenzene} + HNO_3 \xrightarrow{K_3} \text{trinitrobenzene} + H_2O .$$

Assuming each reaction is linearly dependent on the concentrations of each reactant, derive a dynamic mathematical model of the system. There are two feed streams, one pure benzene and one concentrated nitric acid, 98% by wt. Assume constant densities and complete miscibility. **[18]**

OR

Q6) Derive the model for Batch reactor with heating phase & cooling phase. **[18]**

SECTION - II

Q7) Develop the model for Batch Distillation column. **[16]**

OR

Q8) Develop the model for Inverted Distillation column. **[16]**

Q9) Develop the model for Slurry Reactor. **[18]**

OR

Q10) Develop the model for Bioreactor. **[18]**

Q11) What is process simulation? Explain in detail. **[16]**

OR

Q12) Enlist the different Process Modeling Software and discuss CHEMCAD in detail. **[16]**

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[4064] - 409

B.E. (Civil)

MATRIX METHODS OF STRUCTURAL ANALYSIS

(Elective - II) (2008 Course) (Revised) (Sem. - I) (401005(A))

Time : 3 Hours]   *[Max. Marks :100*

Instructions to the candidates:

    1)   *Solve Q1 or Q2, Q3 or Q4, Q5 or Q6 from Section I and solve Q.7 or Q.8, Q.9 or Q10, Q11 or Q.12 from Section II.*

    2)   *Answers to the two sections must be written in separate answer books.*

    3)   *Figures to the right indicate full marks.*

    4)   *Use of pocket calculator is allowed.*

    5)   *Draw neat sketches wherever necessary.*

SECTION - I

Q1) a)   Find which matrix you can invert?   **[6]**

i) $\begin{bmatrix} 2 & 0 & 5 \\ 6 & 7 & 2 \end{bmatrix}$ ii) $\begin{bmatrix} 1 & 2 & 3 \\ 4 & 5 & 6 \\ 7 & 8 & 9 \end{bmatrix}$ iii) $\begin{bmatrix} 4 & 2 & -3 \\ 2 & 7 & -1 \\ -3 & -1 & 5 \end{bmatrix}$

   b)   Using Gauss Jordan method find inverse of Matrix [A].   **[10]**

$$[A] = \begin{bmatrix} 5 & 5 & -10 \\ 2 & 3 & 4 \\ 5 & 6 & 7 \end{bmatrix}$$

OR

Q2) a)   State different numerical methods to solve a system of simultaneous equations.   **[6]**

   b)   Solve following simultaneous equations using Gauss - Elimination technique.   **[10]**

$$2x_1 + x_2 + x_3 = 7$$
$$4x_1 + 2x_2 + 3x_3 = 4$$
$$x_1 - x_2 + x_3 = 0.$$

Q3) A two span continuous beam ABC is fixed at A and simply supported at B & C. AB = BC = 6m. It carries concentrated load of 150 kN at centre of AB and uniformely distributed load of 25 kN/m over BC. EI is uniform & it is 10,000 kN/m². Find redundants MA & MB using flexibility method.   **[16]**

Q4) A portal frame ABC shown in the figure 1 is subjected to uniformely distributed load of 20 kN/m over BC. Draw B.M. diagram. EI is uniform. Use flexibility method for analysis. AB = 4m, BC = 3m. **[16]**
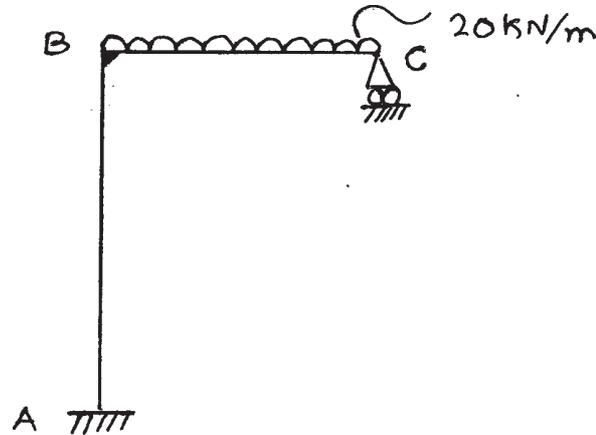
FIGURE-1

Q5) A pin jointed structure is shown in Figure 2. **[18]**
   a) Number the nodes for minimum band width.
   b) State the size of overall matrix of the structrure.
   c) Which rows & columns are deleted to consider boundary conditions.
   d) Write explicitely force & displacement vectors.
   e) State size of reduced matrix equation.

FIGURE-2

OR

Q6) Two cantilevers are united together by means of pin at B as shown in figure 3. For the loads acting, find fixing moments at A & C. Use stiffness matrix method. EI is uniform. **[18]**
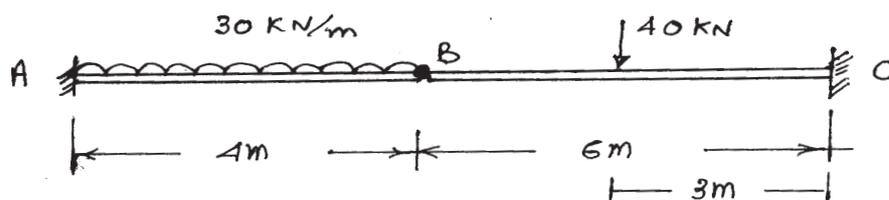
FIGURE-3

SECTION - II

Q7) a) Explain member approach & structure approach in case of analysis of plane portal frame. Taking a suitable example, write step by step procedure in each case. **[8]**
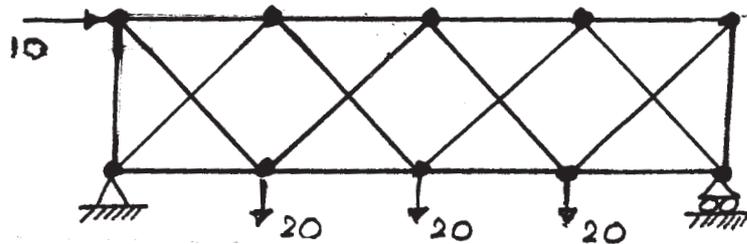
b) Using first principles, establish relationship between local & global stiffness matrix of portal frame member. State clearly transformation matrix. **[8]**

OR

Q8) Analyse and draw B.M. diagram for portal frame as shown in figure 4. Use stiffness matrix method. **[16]**
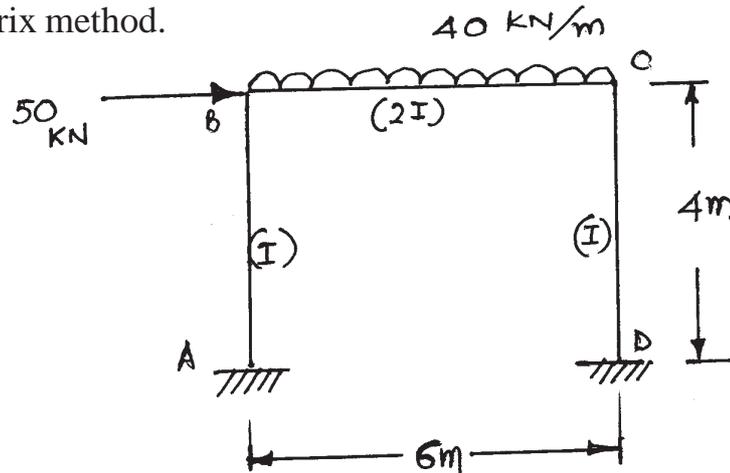
FIGURE - 4

Q9) a) Using proper DOFs, write clearly stiffness matrix equation for a member of orthogonal grid structure. Explain various terms involved in matrix equation. **[8]**

b) Using structure approach, develop only stiffness matrix of grid structure shown in figure 5. GJ = 0.4 EI. & Uniform for all members. **[10]**
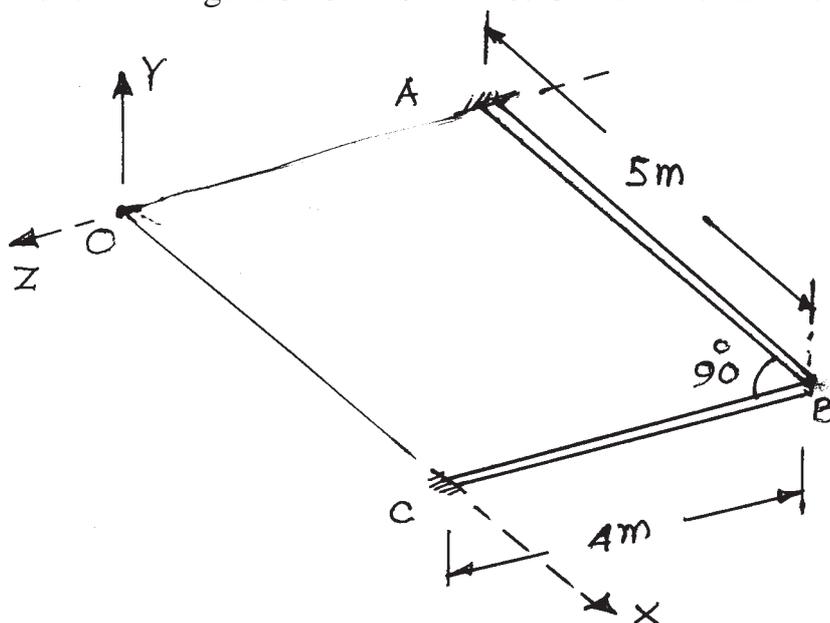
FIGURE 5

*Q10)*Analyse & draw bending moment diagram for grid structure of Q.9(b) as shown in figure 5 if it carries vertical downward load of 50 kN at B. Use stiffness matrix method. **[18]**

*Q11)*Stating clearly DOFs/node, explain stiffness matrices for space truss member & space frame member. In which case you need transformation matrix? Explain reason. **[16]**

OR

*Q12)*Explain input data, input file and results in output file in case of software solution of plane truss problem. Take a suitable example of truss & write details as per the format of software you have used. **[16]**

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P552

[4064] - 415

B.E. (Mechanical)

CAD/CAM AND AUTOMATION

(2008 Course) (402041) (Sem. - I)

Time : 3 Hours]   *[Max. Marks :100*

Instructions to the candidates:

1)   Answer three questions from each section.

2)   Answers to the two sections should be written in separate books.

3)   Neat diagrams must be drawn wherever necessary.

4)   Figures to the right indicate full marks.

5)   Use of calculator is allowed.

6)   Assume suitable data, if necessary.

SECTION - I

Q1) a)   Derive concatenated transformation matrix for rotation with respect to any reference point (xr, yr).   **[6]**

b)   A triangle with vertices A(8, 0), B(12, 0) and C(8, 3) has undergone the following operations. Find the concatenated matrix and then find new coordinates of Δ ABC.   **[10]**

   i)   Rotated by 90º in anticlockwise direction about (3, 0).

   ii)   Mirrored about line y = x.

   iii) Scaled using overall scaling factor of 2 with respect to point (2, 0).

OR

Q2) a)   What are the advantages of Open GL? Write down syntax of the commands for rotation, translation & scaling using Open GL. Also explain the significance of the terms in the commands.   **[8]**

b)   A triangle is defined by the vertices A (1, 2, 4), B (4, 3, 5) and C (5, 8, 3). The three orthographic views are to be projected. Write transformation matrices and hence determine coordinates of Front, Top and Right hand side views.   **[8]**

Q3) a) Differentiate between implicit and explicit forms of the non-parametric curves. How are these curves different from parametric curves? **[8]**

b) A line is represented by end points P(5, 7, 2) & Q(-4, 6, 3). If 'u' at P and Q is 0 & 1 respectively, determine its length. Also find out the coordinates of points represented by u = 0.4, u = -0.25 and u = 1.5.**[8]**

OR

Q4) a) Differentiate between Bezier and B-spline surfaces. **[8]**

b) Explain following terms with respect to solid modeling. **[8]**
   i) Constructive Solid Geometry.
   ii) Boundry Representation.
   iii) Feature based modelling.
   iv) Constraint based modelling.

Q5) a) Find the deflection of each springs shown in figure 1. **[6]**
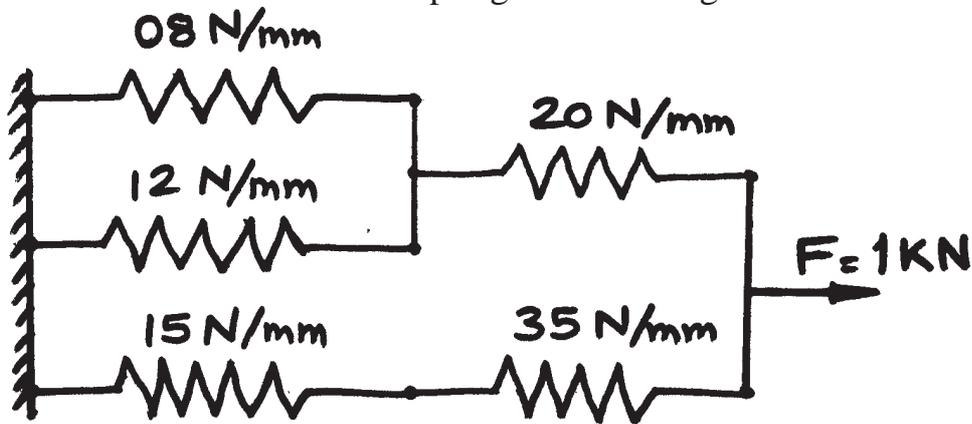
Figure 1, Q 5 (a)

b) A three bar truss is shown in figure 2. Modulus of elasticity of the material is 2×10^5 N/mm^2. The cross sectional area of each element is 50 mm^2.**[12]**
Determine:
   i) The element stiffness matrix.
   ii) Global Stiffness Matrix.
   iii) Nodal displacement.
   iv) Stresses in each element.
   v) Reaction force.
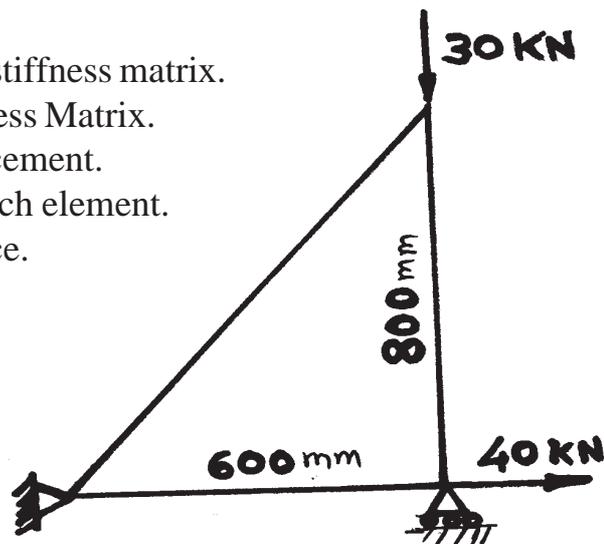
Figure 2, Q5 (b)

Q6) a) Explain penalty approach to solve one dimensional FEM problems. **[6]**

b) A tapered bar is shown in figure 3. Model the bar by considering it as made up of 3 elements of equal length and hence find out the deflection of free end and reaction at support using elimination approach. Also find the stress at the midpoint. Assume $E = 2 \times 10^5$ N/mm^2. **[12]**
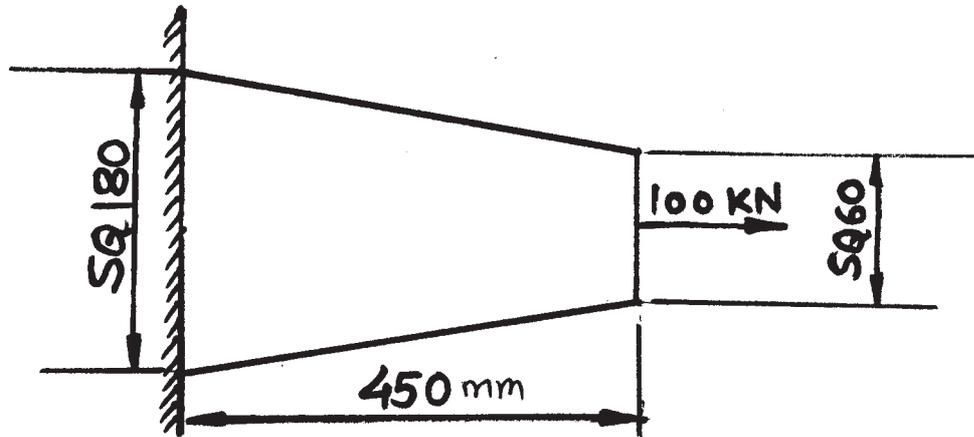
Figure 3, Q 6 (b)

SECTION - II

Q7) a) What are the features of CNC machines as compared to NC machines. **[6]**

b) Write a CNC part program for the component as shown in Figure 4 by using G and M codes for Fanuc controller. Use canned cycle for roughing, finishing and threading operations. Raw material size is 45×60 mm. Assume suitable machining data for machining of mild steel (feed, speed, coolant etc). **[12]**
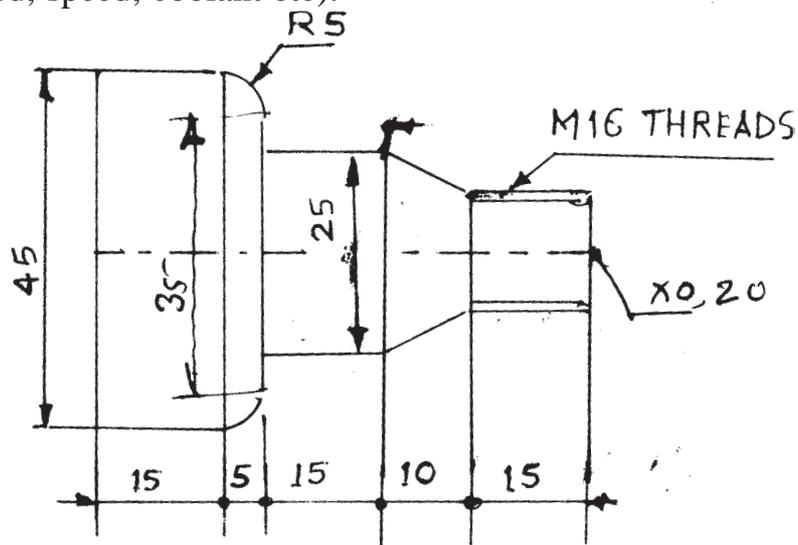
Figure 04 (Q7b)

✗ all dimensions are in mm

Q8) a) What are the different types of Adaptive controls in NC machines. Explain Adaptive control by optimisation (ACO) with suitable example. **[6]**

b) Write a CNC program by using G and M code for Fanuc controller for the contour cutting and through drilling for the component shown in Figure 5. use the concept of subprogram for contour cutting such that depth of cut per pass is 1 mm. Use canned cycle for drilling operation. Raw material is 120 mm × 100 mm × 5 mm. Assume suitable data for cutting parameters like feed, speed coolant etc for machining mild steel. **[12]**
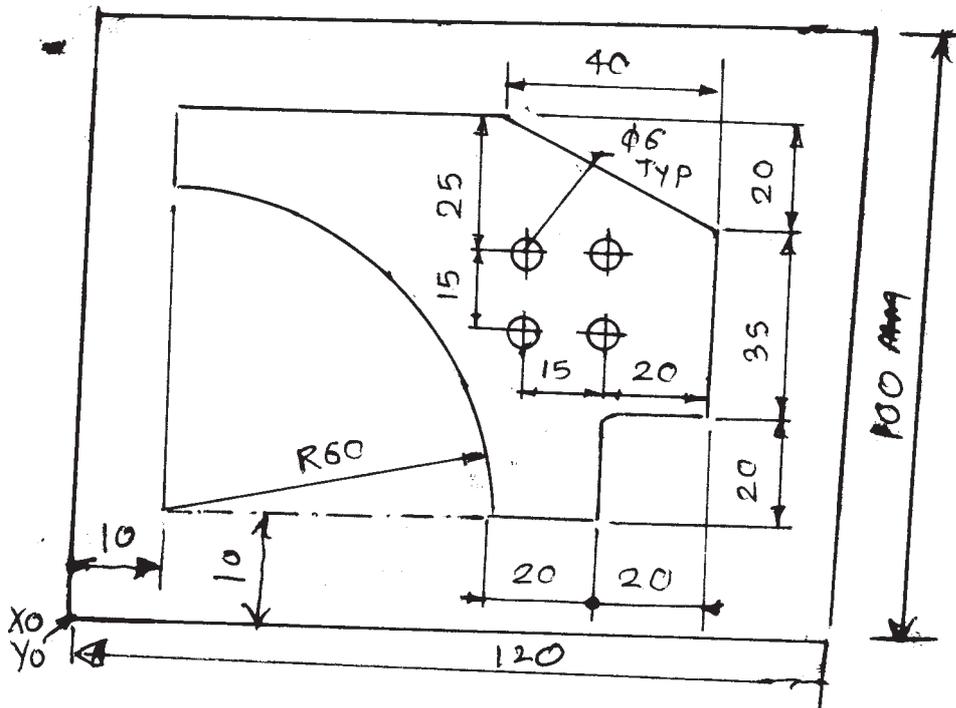
Figure 05 (Q8 b)

Q9) a) Define Automation. What are the different strategies in Automation. **[6]**

b) Explain the parts classification and coding system for Group Technology.**[6]**

c) Explain Geneva Mechanism used for indexing. **[4]**

OR

*Q10)*a) What are different components of FMS. **[8]**

b) Write short note on computer Integrated manufacturing. **[8]**

*Q11)*a) Name the various configuration of Robot and Explain SCARA configuration with application. **[8]**

b) Name the different grippers used in material handling by robots with one application of each. Explain the working of magnetic gripper with sketch. **[8]**

OR

*Q12)*a) Explain the application of Robot in ARC welding operation. **[6]**

b) What are the different methods of Robot programming. **[6]**

c) Explain various motion commands in VAL language of Robot programming. **[4]**

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[4064] - 417

B.E. (Mechanical)

INDUSTRIAL FLUID POWER

(2008 Course) (402043) (Sem. - I)

Time : 3 Hours]   *[Max. Marks :100*

Instructions to the candidates:

1) Attempt three questions from each section.

2) Figures to the right indicate full marks.

3) Assume suitable data.

4) Answer to the two sections should be written separately.

SECTION - I

Q1) a) Classify the types of hydraulic fluids. What are desirable properties of a hydraulic fluid? **[6]**

b) Discuss in brief the different materials used for seals used in hydraulic components. **[6]**

c) Explain the term 'rating of filters' and discuss in brief on 'pressure line filters'. **[6]**

OR

Q2) a) Compare characteristics of petroleum oil based and water based fluids used in hydraulic systems. **[6]**

b) Explain the difference between flared fitting and a compression fitting.**[6]**

c) Write in brief on 'contamination control'. **[6]**

Q3) a) Discuss with drawing the performance characteristics of a gear pump.**[6]**

b) What size of accumulator is necessary to supply 500 cc of a fluid in a hydraulic system of maximum operating pressure of 200 bar which drops to 100 bar minimum? Assume nitrogen gas pre-charge of 66 bar. Find adiabatic and isothermal solution. **[6]**

c) Discuss the factors influencing the selection of type of a pump for a particular application. **[4]**

OR

Q4) a) Enumerate the different types of accumulators and explain 'Gas charged accumulator'. **[6]**

b) Sketch and explain construction, working and performance of parallel piston pump. **[6]**

c) What are the functions of reservoirs? Draw a neat sketch of standard reservoir showing its Internal and external features. **[4]**

P.T.O

Q5) a) What is a function of a pressure relief valve? Draw simple sketch and symbol and explain its working. State its applications. **[8]**

b) Explain in detail with neat sketch how a pressure compensated flow control valve works. Name one application of this valve. **[8]**

OR

Q6) a) What is 'open centre' and 'closed centre' valve position of directional control valve (DCV). Explain with sketch the importance and applications of these center positions of DCV. **[8]**

b) Write short note on: Meter in and Meter out circuits. **[8]**

SECTION - II

Q7) a) Explain the need for speed control of Hydraulic motor. Explain in brief any two methods of it. **[6]**

b) Explain the applications of Tandem & Telescopic cylinders. **[4]**

c) Explain the various efficiencies related to Hydraulic motors. **[6]**

OR

Q8) a) A Hydraulic system consists of two cylinders. The cylinders required to be operated as per the following sequence:-
   i) cylinder 'A' extends.
   ii) cylinder 'B' extends.
   iii) cylinder 'A' retracts.
   iv) cylinder 'B' retracts.
   Develop a hydraulic circuit for above requirements. **[8]**

b) What do you mean by cushioning of cylinders? How it is done? **[4]**

c) Identify the following components: **[4]**

i)

ii)

iii)

iv)

Q9) a) Draw the pneumatic circuits consisting of following components:
  i) Shuttle valve ii) Quick Exhaust valve.
  Draw the separate circuits & explain their working. **[8]**

  b) Can we use atmospheric air directly in pneumatic systems? If no, why?
  What should be done to make use of it? **[4]**

  c) Write a short note on vaccum pump. **[4]**

OR

*Q10)*a) Write any two applications in industry requiring vaccum for their
  operation. **[6]**

  b) Differentiate clearly between Hydraulic & pneumatic motor. **[4]**

  c) A pneumatic system is required to paste the stickers on a part. The
  operation is need to be repeated after every 10 seconds. Draw a suitable
  pneumatic circuit satisfying above requirement. **[6]**

*Q11)*A machine Tool slide is to be moved by means of Hydraulic cylinder as
  follows:
  a) Initially it moves through a distance of 250 mm against a load of 10 kN in
  5 seconds.

  b) It then follows a working stroke of 120 mm against an effective load of
  40 kN. The feed rate required is between 0.5 to 1m/min.

  c) The return stroke is as fast as possible.
  A meter out circuit is used for speed control.
  Draw the circuit & select different components used in circuit. **[18]**

OR

*Q12)*Two similar cylinders A & B are to be operated simultaneously. The load For
  cylinder A is 20 kN & for B is 25 kN. Cylinders A & B has a stroke of 1M
  which need to be completed in 25 seconds. The cylinder B should starts
  retracting when cylinder A has completed its retraction. Returning of cylinders
  are as quickly as possible.
  Draw a circuit as per above requirements. Select all the components used in
  circuit from standard data tables. **[18]**

DATA

1. Suction Strainer :

Model	Flow Capacity (/pm)
S_1	38
S_2	76
S_3	152

2. Pressure Gauge :

Model	Range (bar)
PG_1	0 - 25
PG_2	0 - 40
PG_3	0 -100
PG_4	0 - 160

3. Vane Pump :

Model	Delivery in / pm		
	at 0 bar	at 35 bar	at 70 bar
P_1	8.5	7.1	5.3
P_2	12.9	11.4	9.5
P_3	17.6	16.1	14.3
P_4	25.1	23.8	22.4
P_5	39.0	37.5	35.6

4. Relief Valve :

Model	Flow capacity (/ pm)	Max Working Pressure & bar
R_1	11.4	70
R_2	19	210
R_3	30.4	70
R_4	57	105

5. Flow control Valve :

Model	Working Pressure (bar)	Flow Range (/pm)
F_1	70	0-4.1
F_2	105	0-4.9
F_3	105	0-16.3
F_4	70	0-24.6

6. Directional Control Valve :

Model	Max working Pressure (bar)	Flow Capacity (/pm)
D_1	350	19
D_2	210	38
D_3	210	76

7. Check Valve :

Model	Max working Pressure (bar)	Flow Capacity (/pm)
C_1	210	15.2
C_2	210	30.4
C_3	210	76

8. Pilot Operated Check Valve :

Model	Max working Pressure (bar)	Flow Capacity (/pm)
PO_1	210	19
PO_2	210	38
PO_3	210	76

9. Cylinder-(Max Working Pressure-210 bar)

Model	Bore dia. (mm.)	Rod dia (mm)
A_1	25	12.5
A_2	40	16
A_3	50	35
A_4	75	45
A_5	100	50

10. Oil Reservoirs :

Model	Capacity (litres)
T_1	40
T_2	100
T_3	250
T_4	400
T_5	600

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[4064] - 418

B.E. (Mechanical)

ENERGY AUDIT AND MANAGEMENT

(Elective - I) (2008 Course) (402044A)

Time : 3 Hours]   *[Max. Marks :100*

Instructions to the candidates:

1)   *Answer three questions from each section.*

2)   *Answers to the two sections must be written in separate books.*

3)   *Neat diagrams must be drawn wherever necessary.*

4)   *Figures to the right indicate the full marks.*

5)   *Use of logarithmic tables, slide rules, Mollier charts, electronic pocket calculators and steam tables is allowed.*

6)   *Assume suitable data, if necessary.*

SECTION - I

Q1) a)   Discuss environmental impacts due to conventional energy use.   **[8]**

b)   Discuss the energy policy of the Government and explain the concept of energy management.   **[8]**

OR

Q2) a)   Explain the duties of Energy Manager and Energy Auditor.   **[8]**

b)   Write a short note on   **[8]**

   i)   Energy Action Planning.

   ii)   Energy Security.

Q3) a)   Explain stepwise procedure to carryout detailed energy audit.   **[8]**

b)   What are different Energy Conservation Opportunities in Compressed Air System?   **[8]**

OR

Q4) a)   What are different Energy Conservation Opportunities in Boiler System.**[8]**

b)   Explain the different instruments used for Energy Audit with their application.   **[8]**

Q5) a)   Briefly describe the various financial analysis techniques for investments in energy efficiency projects and their suitability of application.   **[10]**

b)   What is the NPV for a project of life 2 years, which requires the capital investment of Rs.50,000 and yield Rs. 30,000 in the first year and Rs.40,000 in the second year, if the interest rate is 9%.   **[8]**

P.T.O

Q6) a) Explain the concept of Time Value of Money. **[6]**

b) What is Sensitivity Analysis? List different factors considered for sensitivity Analysis. **[6]**

c) A sum of Rs. 30,000 is deposited in a bank at the beginning of a year. The bank pays 6% interest annually. How much money will be in the bank account at the end of the fifth year, if no money is withdrawn? **[6]**

SECTION - II

Q7) a) Enlist the types of stream trappers and explain anyone of them with a neat sketch. **[8]**

b) Find out the efficiency of the boiler by direct method with the data given below: **[8]**

i) Type of boiler : Coal fired.

ii) Quantity of steam (dry) generated : 12 TPH.

iii) Steam pressure (gauge) / temp : 10 kg/cm^2(g)/200°C.

iv) Quantity of coal consumed : 2.1 TPH.

v) Feed water temperature : 75°C.

vi) Gross Calorific Value of Coal : 12000 KJ/kg.

vii) Enthalpy of saturated steam at 10.2 kg/cm^2 pressure : 1785 KJ/kg.

viii) Enthalpy of feed water : 320 KJ/kg.

OR

Q8) a) Enlist and discuss the energy saving methods for the pumping system. **[8]**

b) The connected loads for the bungalow are as below: **[8]**

i) 05 bulbs of 60 W each,

ii) 06 fluorescent tubes of 40 W each,

iii) An old refrigerator of 200 W.

It is decided to replace the bulbs and tubes with 11 CFL of 15 W each and an old refrigerator by energy efficient refrigerator of 175 W. Considering usages of 6 hours per day and an electrical tariff of Rs. 4 per kWh; calculate an annual electrical energy saving in kWh and money.

Q9) a) Explain the following terms in brief **[10]**

i) Lux.

ii) Colour rendering index.

iii) Ballast.

iv) Luminance.

v) Luminous efficacy.

b) What are the types of lamps used in lighting system? Write down their features with typical applications. **[8]**

*Q10)*a) What are different types of motors? Explain in detail the energy efficiency improvements in energy efficient motors. **[10]**

b) Write short note on the following: **[8]**
   i) Electricity Act 2003.
   ii) Power factor improvement.

*Q11)*a) Explain the concept of cogeneration with a neat sketch. **[8]**

b) What are the benefits of waste heat recovery? And explain the concept of heat wheel. **[8]**

OR

*Q12)*a) Explain the term topping cycles and bottoming cycles with examples.**[8]**

b) Explain in brief: **[8]**
   i) CDM Projects.
   ii) Carbon Credit Calculation.

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[4064] - 419

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B.E. (Mechanical)

PRODUCT DESIGN AND DEVELOPMENT

(Elective - I) (402044 - (B)) (2008 Course) (Sem. - I)

Time : 3 Hours]   *[Max. Marks :100*

Instructions to the candidates:

1) Answer any 3 questions from each section.

2) Answers to the two sections should be written in separate books.

3) Neat diagrams must be drawn wherever necessary.

4) Figures to the right indicate full marks.

SECTION - I

Unit - I

Q1) a) Explain Seven Phases of Morphology used in product Design.   **[8]**

b) Discuss the concept of Concurrent design.   **[8]**

OR

Q2) a) Differentiate between product verification & product validation. **[8]**

b) What is Rapid prototyping? Discuss in detail.   **[8]**

Unit - II

Q3) a) How mission statement is decided with the help of technical questionary? Explain with suitable example.   **[9]**

b) Explain different types of customer needs. How they are Identified? **[8]**

OR

Q4) a) Explain the concept of economic analysis of a product with appropriate example.   **[9]**

b) Explain the relationship of S-curve & technology forecasting.   **[8]**

Unit - III

Q5) a) Explain the steps in concept generation process.   **[8]**

b) Explain Pugh's concept selection chart with an appropriate example.**[9]**

OR

Q6) a) Explain the importance of failure modes & effects analysis in concept embodiment.   **[9]**

b) Explain in detail FAST method.   **[8]**

P.T.O

SECTION - II
Unit - IV

Q7) a) Explain subtract and operate procedure in detail with suitable example.**[8]**

  b) What is force flow diagram? Explain with suitable example. **[8]**

OR

Q8) a) Explain the concept of House of Quality in detail with suitable example.**[8]**

  b) Explain function based Modularity & Manufacturing based Modularity in detail. **[8]**

Unit - V

Q9) a) Discuss the guidelines of design for Assembly in detail. **[9]**

  b) Elaborate the concept of Design for piece part production. **[8]**

OR

*Q10)*a) What are Environmental objectives? Discuss local and global issues in detail. **[9]**

  b) Explain weighted sum Assessment Method for lifecycle assessment in detail. **[8]**

Unit - VI

*Q11)*What is product Lifecycle Management? Explain the elements & significance of PLM in detail. **[17]**

OR

*Q12)*a) Explain different phases of product Life cycle. **[9]**

  b) What is product Date Management? Discuss in detail. **[8]**

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P556

[4064] - 420

B.E. (Mechanical)

DESIGN OF PUMPS, BLOWERS AND COMPRESSORS

(402044(C)) (Elective - I) (2008 Course) (Sem. - I)

Time : 3 Hours]   *[Max. Marks :100*

Instructions to the candidates:

1) Answer any three questions from each section.

2) Answers to the two sections should be written in separate books.

3) Neat diagrams must be drawn wherever necessary.

4) Figures to the right indicate full marks.

5) Use of logarithmic tables slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.

6) Assume suitable data, if necessary.

SECTION - I

Q1) a) Explain dimensional analysis for compressible and incompressible flow machines. **[8]**

b) A centrifugal pump delivers $2.5 m^3/s$ under a head of 14m and running at a speed of 2010 rpm. The impeller diameter of the pump is 125 mm. If a 104mm diameter impeller is fitted and the pump runs at a speed of 2210 rpm, what is the volume rate? Determine also the new pump head. **[8]**

OR

Q2) a) Explain the performance characteristics of pumps, compressors, fans and blowers. **[8]**

b) Write equations of energy transfer between fluid and rotor. **[6]**

c) Define specific speed. What is its significance? **[2]**

Q3) a) The impeller of a centrifugal pump has 1.2 m outside diameter. It is used to lift 1800 liters of water per second against a head of 10 m. Its vanes make an angle of 30º with the direction of motion at outlet and runs at 200 rpm. If the radial velocity of flow at outlet is 2.5 m/s, find the manometric efficiency. Also find the power required if the overall efficiency is 82%. **[8]**

b) Explain various efficiencies of centrifugal pump. **[8]**

OR

Q4) a) Explain various types of characteristic curves usually prepared for centrifugal pumps. **[8]**

b) What is NPSH derive the expression of the same. Find the height from the water surface at which a centrifugal pump may be installed in the following case to avoid cavitation: Atmospheric pressure = 1.01 bar; vapour pressure = 0.022 bar; losses in suction pipe = 1.42 m; effective head of pump = 49m; and cavitation factor = 0.115. **[8]**

Q5) a) Explain the design procedure of centrifugal pump. **[8]**

b) Explain various forms of corrosion occurred in hydraulic machines. **[10]**

OR

Q6) a) Explain various application areas of centrifugal pump. **[10]**

b) Explain general design considerations of pump casing. **[8]**

SECTION - II

Q7) a) Define stagnation state and derive equations for **[6]**

i) stagnation enthalpy.

ii) stagnation temperature.

iii) stagnation velocity of sound.

iv) stagnation pressure and

v) stagnation density.

b) An axial fan stage consisting of rotor and UGVs for - ve inlet swirl and to eliminate outlet swirl, has the following data: **[10]**

Rotor blade air angle at inlet   86°

Tip diameter   60 cm

Hub diameter   30 cm

Rotational speed   960 rpm

Power required   2 kW

Flow coefficient   0.245

(Inlet flow conditions P_1 = 1.02 bar, T_1 = 316 K)

Determine the rotor blade angle at exit, the flow rate, stage pressure rise, overall efficiency, degree of reaction and specific speed.

OR

Q8) a) Prove the following relations for an axial fan stage with UGVs and DGVs:
$(\Delta p)_{st} = 2 \rho u^2 (\tan \alpha_2 - 1)$, $\psi = 4(\tan \alpha_2 - 1)$ and R = 1. **[6]**

b) A centrifugal blower with a backward a blade with 60° impeller tip angle produces a pressure equivalent to 100 cm column of water. The pressure and temperature at its entry are 0.98 bar and 310 K. The electric motor driving the motor runs at 3000 rpm. The efficiencies of fan and drive are 82% and 88 % respectively. The radial velocity remains constant and has a value of 0.2 u_2. The velocity at the inlet eye is 0.4 u_2. **[10]**
If the blower handles 200 m³/min of air at the entry conditions, determine:
   i) Power required by the electric motor.
   ii) Impeller diameter.
   iii) Inner diameter of the blade ring.
   iv) Air angle at entry.
   v) Impeller width at entry and exit.
   vi) Number of impeller blades, and
   vii) The specific speed.

Q9) a) Explain functions of an airfoil and discuss the characteristic curves of airfoils. **[8]**

b) What are the main causes of noise generation? What are the methods of reducing fan noise? **[8]**

OR

Q10) a) State design considerations and empirical relations used to determine various fan design parameters. **[8]**

b) Write a short note on: **[8]**
   i) Surge and stall
   ii) Cascade variables

Q11) a) What is the work done factor for an axial compressor stage? How does it vary with the number of stages? **[6]**

b) An axial compressor stage has the following data: **[12]**

Temperature and pressure at entry 300 K, 1 bar	
Degree of reaction	50%
Mean blade ring diameter	36 cm
Rotational speed	18000 rpm
Blade height at entry	6 cm
Air angle at rotor and stator exit	25°
Flow coefficient	0.53
Work-done factor	0.88
Stage efficiency	85%
Mechanical efficiency	96.7%

Determine:
i)   Air angles at rotor and stator entry.
ii) The mass flow rate of air
iii) The power required to drive the compressor.
iv) The loading coefficient.
v)   The pressure ratio developed.
vi) The Mach number at stator entry.

OR

Q12)a) In a centrifugal compressor air enters at a stagnation temperature of 288 K and stagnation pressure of 1.01 bar. The impeller has 17 backward vanes and no inlet guide vanes. **[12]**
Assume constant radial velocity.
The following data apply;

Mass flow rate	:	2.5 kg/s
Impeller tip speed	:	475 m/s
Impeller blade angle at tip	:	60°
Mechanical efficiency	:	96%
Absolute air velocity at diffuser exit	:	90 m/s
Compressor isentropic efficiency	:	84%
Absolute air velocity at impeller inlet	:	150 m/s
Diffuser efficiency	:	82%
Axial depth of impeller γ	:	6.5 mm
Power input factor	:	1.04
for air	:	1.4

Determine:
1. Shaft power
2. Stagnation and static pressure at diffuser outlet.
3. Absolute Mach number and stagnation and static pressure at the impeller exit, assume R = 0.5.
4. Rotational speed.

b) What is "slip factor"? What is its effect on the flow and the pressure ratio in the stage? **[6]**

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[4064]-421

B.E. (Mechanical)

TRIBOLOGY

(Elective - I) (2008 Course) (Sem. - I) (402044(D))

Time : 3 Hours]　　　　　　　　　　　　　　　　　　　*[Max. Marks :100*

Instructions to the candidates:

1)　Answers to the two sections should be written in separate books.

2)　Neat diagrams must be drawn wherever necessary.

3)　Figures to the right indicate full marks.

4)　Use of logarithmic tables slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.

5)　Assume suitable data, if necessary.

SECTION - I

Unit - I

Q1) a)　Using stribeck curve explain the range and types of lubrication modes.**[6]**

　　　b)　Explain extreme pressure lubricants [EP] where they are used.　**[6]**

　　　c)　An oil of viscosity of 70 cp and relative density of 0.7 is used for lubrication. Convert the viscosity into centi-stoke. SUS.　**[4]**

OR

Q2) a)　Compare between sliding and rolling contact bearing.　**[6]**

　　　b)　Write the short note on following:　**[6]**

　　　　　i)　Anti - friction additives.

　　　　　ii)　Anti - wear additives.

　　　　　iii)　Anti - scuff additives.

　　　c)　Explain the process and methods of recycling of the used oil.　**[4]**

Unit - II

Q3) a)　Explain the following theories of friction:　**[12]**

　　　　　i)　Mechanical Interlocking theory.

　　　　　ii)　Simple Adhesion theory.

　　　　　iii)　Modified Adhesion theory.

　　　b)　What are the factors affecting wear.　**[4]**

OR

P.T.O

Q4) a) Write a short note on: **[12]**
   i) Abrasive wear.
   ii) Surface fatigue wear.
   iii) Stick - slip phenomenon in friction.
   b) Explain in brief laws of friction. **[4]**

Unit - III

Q5) a) Derive the two dimensional Reynold's equation from the first principle. Write the assumption made. **[12]**
   b) Explain the mechanism of pressure development in hydrodynamic lubrication. **[6]**

OR

Q6) a) With the usual notations, derive an expression for pressure distribution in case of infinite short journal bearing. Show the axial and circumferential pressure distribution. **[12]**
   b) Write a short note on following: **[6]**
   i) Hydrodynamic bearings Advantages and Limitations.
   ii) Sommerfield number.

SECTION - II
Unit - IV

Q7) a) Derive the expression for flow rate through rectangular slot. What are the assumptions made while deriving the equation. **[8]**
   b) The following data refers to a hydrostatic thrust bearing: **[10]**
   i) Shaft diameter = 400 mm
   ii) Recess diameter = 250 mm
   iii) Shaft speed = 720 rpm
   iv) Supply pressure = 5N/mm^2
   v) Film thickness = 0.15mm
   vi) Viscosity of lubricant = 30 CP
   vii) Specific heat of lubricant = 1.76 kJ/kg°C
   viii) Specific gravity of lubricant = 0.86
   Calculate:
   i) Load - carrying capacity of the bearing.
   ii) Oil flow rate.
   iii) Total Power loss.
   iv) Temperature rise.
   Assume that the total power loss in the bearing is converted into frictional heat.

Q8) a) Derive an equation for load - carrying for given instanteneous velocity of approach and film thickness in case of circular plate approaching a plane. **[8]**

b) When a circular plate of diameter 150 mm is approaching a plane at a velocity of 12.5 cm/s at the instant, oil-film thickness is 0.25mm. The viscosity of the oil is 0.035 Pa-s. Evaluate for squeeze film action. **[10]**
   i) the maximum pressure.
   ii) average pressure.
   iii) load - carrying capacity
   iv) time required to squeeze the oil film from 0.25mm to 0.005mm.

Unit - V

Q9) a) Explain the phenomenon of elastohydrodynamic lubrication. **[6]**

b) Compare gas lubricated bearings with oil - lubricated bearings based on the following parameters. **[4]**
   i) lubricant.
   ii) film thickness.
   iii) surface finish.
   iv) Bearing material.

c) State the merits, demerits and applications of gas - lubricated bearings.**[6]**

OR

*Q10)*a) Write short note on any two of the following: **[8]**
   i) Lubrication in wire drawing and extrusion.
   ii) Lubrication in rolling.
   iii) Lubrication in forging.

b) What are the desirable properties of bearing materials? Explain each of them in brief. **[4]**

c) Write the uses of Oil-seals. **[4]**

Unit - VI

*Q11)*a) What is tribological surface? Explain, with neat sketch, the different layers of tribological surface. **[6]**

b) State and explain the different geometrical properties of the surface. **[4]**

c) State the various parameters used for the measurement of surface properties. **[6]**

OR

*Q12)*a) Classify the surface engineering processes. **[4]**

b) Explain, with neat sketch, the electroplating process. **[6]**

c) How surface engineering processes are specified? Explain. **[6]**

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[4064] - 424

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B.E. (Mechanical)

QUANTITATIVE AND DECISION MAKING TECHNIQUES

(Sem. - I) (402045(C)) (2008 Course) (Elective - II) (Theory)

Time : 3 Hours]   *[Max. Marks :100*

Instructions to the candidates:

1) *All the questions are compulsory.*

2) *Two separate answer - books should be used for Section I and Section II.*

3) *Figures to the right indicate full marks.*

4) *Use of log-tables, calculators is permitted.*

SECTION - I
UNIT - I

Q1) a)   Explain the following: **[8]**

i)   Two person Sum Game.

ii)   Saddle Point.

iii)   Dominance Principle

iv)   Pure Strategy.

b)   Reduce the following game by dominance and Find the game value?**[8]**

Player B

		I	II	III	IV
	I	3	2	4	0
Player A	II	3	4	2	4
	III	4	2	4	0
	IV	0	4	0	8

OR

Q2) a)   Explain the Steps in Decision Making.   **[6]**

b)   Solve the following Game?   **[10]**

B

		B_1	B_2
	A1	2	6
A	A2	4	5
	A3	12	4

P.T.O

Q3) a) Explain Dual - Simplex Method. **[6]**

b) Solve LPP by Suitable Method. **[10]**

Maximize $Z = 10x_1 + 20x_2$

Subject to $5x_1 + 2x_2 \leq 30$

$3x_1 + 6x_2 \leq 36$

$2x_1 + 5x_2 \leq 20$

Where $x_1, x_2 \geq 0$.

OR

Q4) a) Explain Sensitivity Analysis with Limitations? **[6]**

b) A firm manufactures two products P_1 P_2 on which the profits earned are Rs. 5 and Rs.8 respectively. Each product is prepared on two machines M_1 and M_2. The machine time required for these products on the two machines and their availability is as shown below.

	Product P_1	**Product P_2**	**Availability of Machines (minutes) per day**
Machine M_1	2	1	400
Machine M_2	4	1	600

Find the number of units of products P1 and P2 to be manufactured per day to get maximum profits? **[10]**

UNIT - III

Q5) a) Differentiate between Transportation problem & Assignment problem?**[2]**

b) Solve the following Transportation problem involving three sources and four destinations. The cell entries represent the cost of transportation per unit. Obtain solution by VAM Method? **[8]**

		1	2	3	4	Supply
	1	3	1	7	4	300
Sources	2	2	6	5	9	400
	3	8	3	3	2	500
Demand		250	350	400	200	1200

c) Solve the assignment problem of four sales persons to four different regions as shown in table below such that total sales are maximized?**[8]**

Sales Region

	1	2	3	4
Salesman 1	10	22	12	14
2	16	18	22	10
3	24	20	12	18
4	16	14	24	20

OR

Q6) a) A college is having a degree programme for which the effective semester time available is very less and the programme requires field work. Hence, a few hours can be saved from the total number of class hours, and can be utilized for the field work. Based on past experiences, the college has estimated the number of hours required to teach each subject by each faculty. The course in its present semester has 5 subjects and the college has considered 6 existing faculty members to teach there courses. The objective is to assign the best 5 teachers out of these 6 faculty members to teach 5 different subjects so that the total number of class hours required in minimized. The data of this problem is summarized as below. Solve the assignment problem optimally? **[14]**

Subjects

	1	2	3	4	5
Faculty 1	30	39	31	38	40
2	43	37	32	35	38
3	24	41	33	41	34
4	39	36	43	32	36
5	32	49	35	40	37
6	36	42	35	44	42

b) Explain Degeneracy in Transportation problem? **[4]**

SECTION - II
UNIT - IV

Q7) a) A fast moving item has a demand of 18,000 units/year. The cost of one procurement is Rs. 50 and inventory carrying or holding cost is Rs. 1.20 per unit/per year. It is assumed that supply is received as soon as the order is placed and no shortage or stock permitted. Cost of one unit is Rs. 8 Determine. **[8]**

  i) EOQ

  ii) Number of Orders/Year

  iii) Interval between orders

  iv) Total cost per year.

b) Define: **[8]**
   i) Queue Length.
   ii) Traffic Intensity.
   iii) Service Channels.
   iv) Service in Priority.

OR

Q8) a) After studying the monthly receipts and payments over the past 20 months a retailer has developed the following data. **[10]**

Monthly Receipts (Rs.)	Probability	Monthly Payments(Rs.)	Probability
30,000	0.20	40,000	0.30
50,000	0.30	60,000	0.40
70,000	0.40	80,000	0.20
1,20,000	0.10	1,00,000	0.10

Using set of random numbers given below, simulate the monthly pattern of receipts and payments for the 12 months of next year, assuming further that the beginning bank balance is Rs. 1,00,000. What is the estimated balance at end of 12 months periods? What is the highest monthly balance during the year? What is the average monthly balance during the year?

Random Numbers

For Receipts   03, 91, 38, 55, 17, 46, 32, 43, 69, 72, 24, 22

For Payments 91, 96, 30, 32, 03, 88, 48, 28, 88, 18, 71, 99

b) Derive an expression for EOQ. **[6]**

UNIT - V

Q9) a) Explain Break Even Analysis and Margin of safety with neat sketch. **[4]**

b) The following data is available for ABC Ltd.

Direct Material Cost / Unit = Rs. 800

Direction Labour Cost / Unit = Rs. 420

Fixed Overheads Rs. 60,000

Variable overheads 40% on direct labour

@ selling price / unit = Rs. 2400

Trade discount 5%

Calculate

   i) B/E Point.
   ii) Net sales volume.
   iii) Net profit for sales 30% above B/E volume.
   iv) Net profit for sales 20% below B/E volumes. **[12]**

OR

*Q10)*a) Explain how the theory of replacement is used in following problems:

    i)   Replacement of items that fail completely.

    ii)   Replacement of items whose maintenance cost varies with time.**[8]**

  b) A JCB excavator operator purchases the machine for Rs. 15,00,000. The operating cost and the resale value of machine is given below. **[8]**

Year	1	2	3	4	5	6	7	8
Operating Cost (Rs.)	30,000	32,000	36,000	40,000	45,000	52,000	60,000	70,000
Resale value in (Lacks of Rs.)	12	10	8	5	4.5	4	3	2

When should the machine be replaced?

UNIT - VI

*Q11)*a) A list of activities, precedence relations and activity completion times is given in the following table. **[13]**

Activity	Predecessor Activities	Time (Days)
A	-	5
B	a	4
C	b	2
D	a,c	6
E	d	8
F	e	5
G	c	4
H	d, e, g, i	13
I	C	2
J	g, h	1
K	f, h, j	6

    i)   Draw an activity on node network diagram.

    ii)   Complete the early start, late start, early finish and late finish and slack times for each activity in the network.

iii) What is the critical path and expected completion time for the project?

b) Write Difference between CPM and PERT?   **[5]**

OR

*Q12)*a) Activities of a small project are given below. The network of this project is also drawn. What is the probability of completing the project within 26 days, within 28 days.   **[12]**

Activity	Most Optimistic Time (days)	Most likely Time (days)	Most pessimistic Time (days)
1 - 2	1	1	1
2 - 3	1	4	7
2 - 4	8	12	10
3 - 5	3	5	7
4 - 5	1	1	1
5 - 6	3	6	9
5 - 7	4	6	8
6 - 8	4	8	12
7 - 8	2	5	8

Use Normal distribution table mentioned below.

Z	0.294	0.796	0.884	2.388
P	0.614	0.7852	0.8104	0.9915

b) Explain different types of floats.   **[6]**

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B.E. (Mechanical S/W)

INDUSTRIAL HYDRAULICS AND PNEUMATICS

(2008 Course) (402062) (Sem. - I)

Time : 3 Hours]   *[Max. Marks :100*

Instructions to the candidates:

1) *All questions are compulsory.*
2) *Answers to the two sections should be written in separate books.*
3) *Neat diagrams must be drawn wherever necessary.*
4) *Figures to the right indicate full marks.*
5) *Use of logarithmic tables, slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.*
6) *Assume suitable data, if necessary.*

SECTION - I

Q1) a)   Discuss properties of petroleum based fluids used in hydraulic systems.
                                                                        [6]

 b)   Write in short on Fluid power applications in hydraulic presses.   **[6]**

 c)   Write in short on Heat Exchangers used in fluid power systems.   **[6]**

OR

Q2) a)   What are the sources of oil contamination? How to control it?   **[6]**

 b)   What are the different types of seals used in various hydraulic components?   **[6]**

 c)   Explain with the help of graphs, the effect of temperature and pressure on hydraulic fluids.   **[6]**

Q3) a)   What is difference between positive displacement and non positive displacement pumps.   **[6]**

 b)   What are the different accessories provided in a hydraulic power unit? What are their functions.   **[6]**

 c)   What are the functions of different components of a typical power unit.**[4]**

OR

P.T.O

Q4) a) What are the different types of accumulators? Also explain different applications of an accumulator with circuits. **[8]**

b) Explain with neat diagram working of a typical vane pump with its characteristics curve. **[8]**

Q5) a) What is purpose of providing pressure switches and temperature switches in hydraulic system. **[6]**

b) What is a pressure compensated flow control valve? Explain with neat sketch & name the pressure control valves. **[10]**

OR

Q6) Write short notes on:

a) Meter in and meter out circuits. Draw & explain the advantages of these circuits. **[8]**

b) A hydraulic cylinder has a bore of 20 cm and a piston rod dia. Of 14 cm if the extend speed of the piston is 6 m/min determine

   i) Flow rate of oil entering, in lps.
   ii) Flow rate of oil leaving from the annulus during extend, in lps.
   iii) Speed of retracting using same flow rate of entering.
   iv) Flow rate from the full bore end on retract. **[8]**

SECTION - II

Q7) Explain the following terms with respect to hydraulic motor.

a) i) Volumetric efficiency.
   ii) Mechanical efficiency.
   iii) Overall efficiency. **[6]**

b) Draw regenerative circuit with centre position regeneration of 4/3 D.C.V. & explain its application. **[12]**

OR

Q8) a) Draw and explain Motor breaking circuit. **[8]**

b) Draw circuits to show the applications of **[10]**
   i) Unloading valve.
   ii) Sequence Valve.

Q9) a) Explain 'FRL' unit in pneumatic systems, with diagrams. **[8]**

b) Draw a neat sketch & explain working of a typical 5 ways 2 position solenoid operated direction control valve used in pneumatic circuits. **[8]**

OR

Q10) Analyse the circuit shown
   a)   in fig (1)   **[8]**
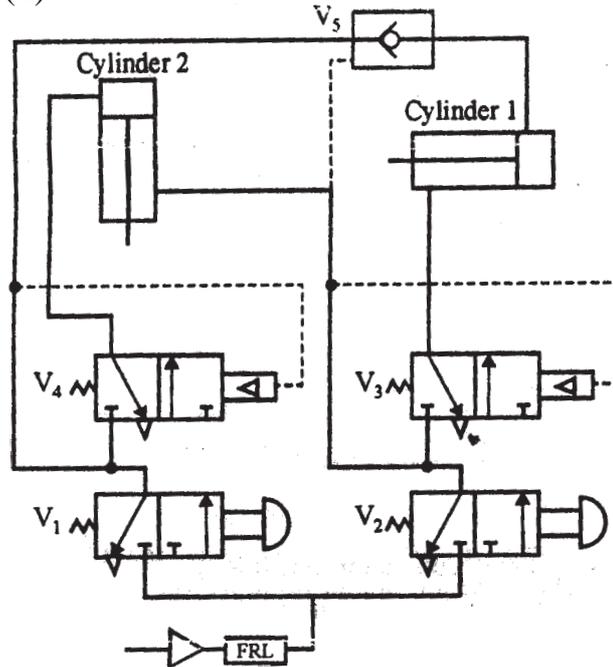
   b)   Draw speed control circuits of hydrolic cylinder. (any two)   **[8]**

Q11) a)   Draw a simple hydraulic circuit which will operate a hydraulic cylinder of a machine provision is required to hold the cylinder any where in between the end positions.   **[6]**
   b)   Draw & explain any typical pneumatic circuit for a control of double acting cylinder.   **[6]**
   c)   Draw symbols
       i)   2 position 4 ports Pilot operated D.C.V.
       ii)   AND valve.
       iii) Direct operated Pr. relief valve.
       iv)   Exhaust port silencer.   **[4]**

OR

Q12) A machine is operated by a hydraulic system. The motion of hydraulic cylinder is used to operate the machine. Total stroke is 600 mm. First 500 mm of stroke is to be completed in about six seconds against a load of 20 kN. The load during remaining 100 mm of the stroke is 40 kN, the speed during this part of stroke is to be 2.5 m/min After stroke is complete the cylinder is to be returned against a load of 20 kN in 6 sec. A meter in circuit is used. Draw hydraulic circuit & select components from the data given. Mention rating of components in case it is not available in the given data.   **[16]**

DATA

1. Suction Strainer :

Model	Flow Capacity (/pm)
S_1	38
S_2	76
S_3	152

2. Pressure Gauge :

Model	Range (bar)
PG_1	0 - 25
PG_2	0 - 40
PG_3	0 - 100
PG_4	0 - 160

3. Vane Pump :

Model	Delivery in / pm		
	at 0 bar	at 35 bar	at 70 bar
P_1	8.5	7.1	5.3
P_2	12.9	11.4	9.5
P_3	17.6	16.1	14.3
P_4	25.1	23.8	22.4
P_5	39.0	37.5	35.6

4. Relief Valve :

Model	Flow capacity (/ pm)	Max Working Pressure & bar
R_1	11.4	70
R_2	19	210
R_3	30.4	70
R_4	57	105

5. Flow control Valve :

Model	Working Pressure (bar)	Flow Range (/pm)
F_1	70	0-4.1
F_2	105	0-4.9
F_3	105	0-16.3
F_4	70	0-24.6

6. Directional Control Valve :

Model	Max working Pressure (bar)	Flow Capacity (/pm)
D_1	350	19
D_2	210	38
D_3	210	76

7. Check Valve :

Model	Max working Pressure (bar)	Flow Capacity (/pm)
C_1	210	15.2
C_2	210	30.4
C_3	210	76

8. Pilot Operated Check Valve :

Model	Max working Pressure (bar)	Flow Capacity (/pm)
PO_1	210	19
PO_2	210	38
PO_3	210	76

9. Cylinder-(Max Working Pressure-210 bar)

Model	Bore dia. (mm.)	Rod dia. (mm)
A_1	25	12.5
A_2	40	16
A_3	50	35
A_4	75	45
A_5	100	50

10. Oil Reservoirs :

Model	Capacity (litres)
T_1	40
T_2	100
T_3	250
T_4	400
T_5	600

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B.E. (Mechanical S/W) (Part - I)

REFRIGERATION AND AIR CONDITIONING

(Elective - II) (402063(A)) (2008 Course) (Sem. - I)

Time : 3 Hours]   *[Max. Marks :100*

Instructions to the candidates:

1)   *Answer any 3 questions from section I and 3 questions from Section II.*

2)   *Answers to the two sections should be written in separate books.*

3)   *Neat diagrams must be drawn wherever necessary.*

4)   *Figures to the right indicate full marks.*

5)   *Use of logarithmic tables slide rule, Mollier charts, electronic pocket calculator and steam tables, p-h chart is allowed.*

6)   *Assume suitable data, if necessary.*

SECTION - I
Unit - I

Q1) a)   Write a note on 'thermoelectric refrigeration'.   **[5]**

b)   Explain the concept of DART.   **[3]**

c)   Explain reduced ambient system with the help of T-S diagram. Derive expression for COP.   **[8]**

OR

Q2) a)   An air compressor works between the pressure of 1 bar and 8 bar on reversed joule engine cycle. The temperature of air entering the compressor is 6.7ºC and after compression the air is cooled to 26.7ºC, before entering the expansion cylinder. Expansion and compression follows the law $PV^{1.35}$ = constant. Determine the COP of the machine and power consumption per kW of refrigeration. Take Cp = 1.005 and C_v = 0.718 kJ/kg K.   **[6]**

b)   Write a note on 'Pulse tube refrigeration'.   **[5]**

c)   Explain reversed carnot cycle used for refrigeration with the help of P-V and T-S diagram. Derive an expression for COP.   **[5]**

Unit - II

Q3) a)   How refrigerants are classified?   **[4]**

b)   What are the desirable properties of good refrigerant.   **[6]**

c)   Write a note on 'Total Equivalent Warming Impact' (TEWI)   **[6]**

OR

Q4) a) Write a note on Montreal protocol and kyoto protocol. **[6]**

b) Give alternate refrigerants for CFC's and HCFC's with justification. **[6]**

c) What is the concept of green building. **[4]**

Unit - III

Q5) a) A typical multipressure system is shown in the Figure. The refrigerant R-134a is used in the cycle. Sketch the cycle on P-h diagram and calculate:

i) Overall COP

ii) Mass flow refrigerant through each evaporator.

iii) Cooling load on condenser assuming that subcooling takes place in condenser. **[8]**
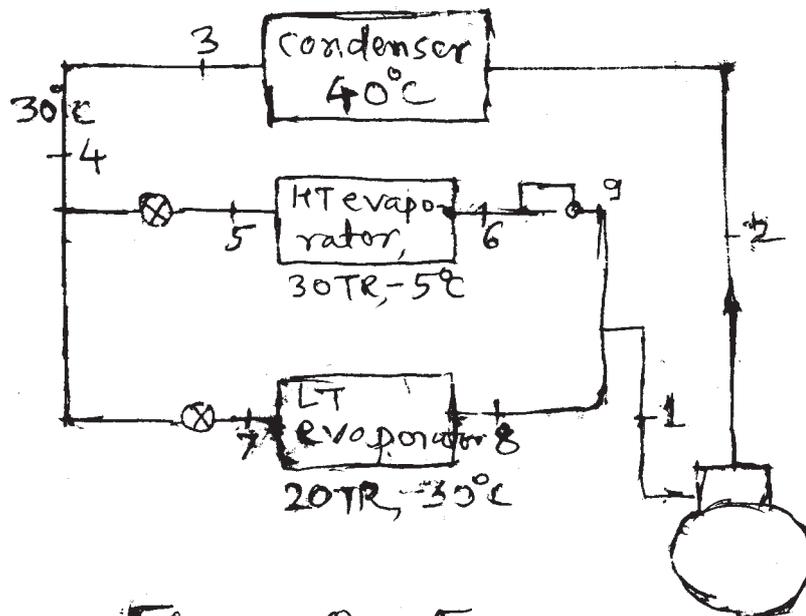
Figure Que 5a

b) Compare VCC and VAC. **[4]**

c) Explain lithium bromide absorption system. **[6]**

OR

Q6) a) Explain two stage compression with flash gas removal. **[6]**

b) Explain cascade system with the help of P-h diagram. **[6]**

c) What is selection criteria of refrigerant absorbent mixture. **[6]**

SECTION - II

Unit - IV

Q7) a) How will you define air conditioning system as against refrigeration system. Classify air conditioning systems and explain with sketch any one system you have classified. **[8]**

b) What is the importance of temperature and humidity in industrial application with a few examples. In what respects this differs from automobile air - conditioning? **[8]**

OR

Q8) Write short notes on the following: **[16]**
   a) Sensible Heat Factor.
   b) Room Sensible heat factor.
   c) Apparatus Dew Point Temperature.
   d) Infitration load.

Unit - V

Q9) a) Enumerate the basic elements of the control system. Explain. **[8]**
   b) Write short notes on: **[10]**
      i) Bimetal type thermostat for room temperature.
      ii) Hair type humidistat for humity control in air - conditioning.

OR

Q10) a) What is a 'duct' in air - conditioning? How will you classify the ducts? Explain. **[6]**
   b) What are the desirable properties of an ideal duct material? Name some commonly used duct materials. **[6]**
   c) What are the different methods used for determination of duct size? Explain any one method. **[6]**

Unit - VI

Q11) a) i) Why do you require to preserve food and vegetable products? **[4]**
      ii) What factors are responsible for the spoilage of the food and vegetable products? **[4]**
   b) Write in short about Transport and Marine refrigeration. **[8]**

OR

Q12) a) What is Cryogenics? List out the difficulties encountered in the production of low temperatures with the help of single or multistage vapour compression refrigeration systems. **[8]**
   b) Explain the different methods of liquefaction of air. What are the advantages of claude system over Linde system? **[8]**

p-h chart
Refrigerant R-134a

Specific enthalpy kJ/kg

Absolute pressure (P) bar
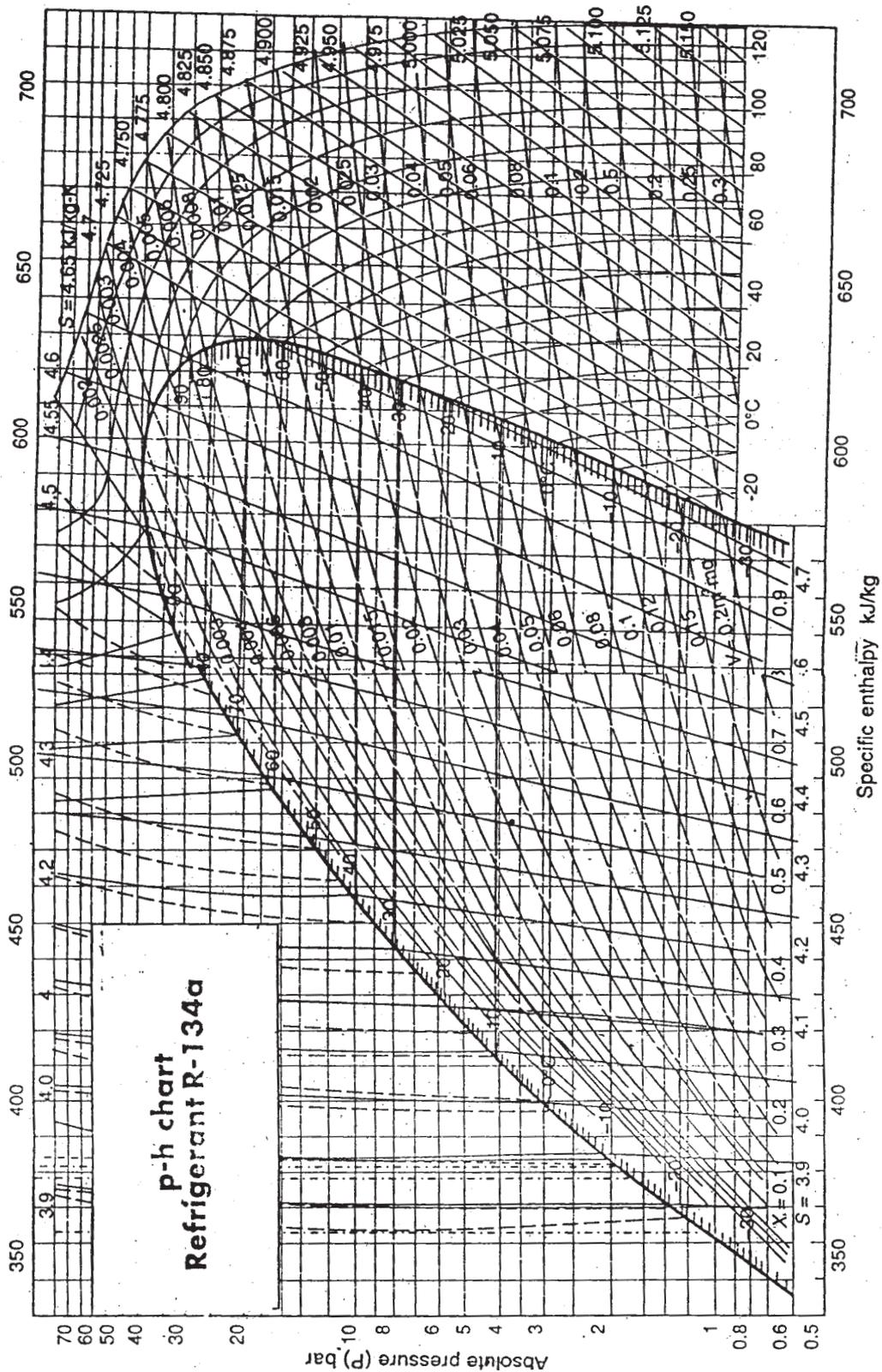
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[4064]-436

B.E. (Production)

MANUFACTURING AUTOMATION

(2008 Course) (411082) (Sem. - I)

Time : 3 Hours]   *[Max. Marks : 100*

Instructions to the candidates:

1) *Answer any three questions from each section.*
2) *Answers to the two sections should be written in separate books.*
3) *Neat diagrams must be drawn wherever necessary.*
4) *Figures to the right indicate full marks.*
5) *Use of logarithmic tables slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.*
6) *Assume suitable data, if necessary.*

SECTION - I

Q1) a) For a swash plate type of pump following data operates :   **[10]**

- Number of pistons = 4.
- Piston diameter = 20 mm.
- Pitch circle diameter of the cylinder = 150 mm.
- Input power = 6 KW.
- Volumetric efficiency = 90%.
- Mechanical efficiency = 89.

Calculate theoretical pump displacement and angle of swash plate if maximum pressure and speed at which pump operates is 150 bar and 1400 rpm respectively.

b) Explain the following terms :

i)	Viscosity.	**[2]**
ii)	Bulk modulus.	**[2]**
iii)	Fire point.	**[2]**
iv)	Neutralization number.	**[2]**

OR

Q2) a) A 500cm^3 sample of oil is compressed in a cylinder until its pressure is increased from one atmosphere to 50 atmosphere. Find the percent change in the volume of the oil if the bulk modulus is 1750 MPa.   **[6]**

b) For a vane pump explain :

- Constructional features (with neat sketch) and operation. **[5]**
- Expression for flow. **[3]**
- Characteristics. **[2]**
- Applications. **[2]**

Q3) a) A hydraulic system requires 350 l/min at 30 bar for 15 seconds and 40 l/min at 280 bar pressure for 35 seconds. Compare the efficiency of the system when operated with and without pressure intensifier. **[8]**

b) Explain with neat sketches the meter out circuit to maintain constant feed rate with variation in load. **[8]**

<div align="center">OR</div>

Q4) a) Explain with neat sketch the design aspects of hydraulic reservoir. **[8]**

b) A hydraulic system having total cycle time of 38 seconds requires 20 l/min flow for 7 seconds. Determine the size of gas accumulator assuming isothermal expansion and compression of gas. (Assume discharge pressure 120 bar). **[8]**

Q5) a) Draw a pneumatic circuit for a machine head of a precision grinder which needs to continuously reciprocate over a cylinder head surface being finished. The speed of the stroke must be controlled in both directions. Also explain its working. **[10]**

b) Explain with neat sketch the working of a 4/2-seat type direction control valve. **[6]**

<div align="center">OR</div>

Q6) a) Draw a pneumatic circuit for a large stamping press to ensure that the part is in place, the clamps are engaged and the safety guards are closed before the press can operate. Also explain its working. **[10]**

b) Explain with neat sketches working of fluidic AND gate and OR gate. **[6]**

<div align="center">

SECTION - II

</div>

Q7) a) Explain with neat sketch the block diagram of a microcontroller. **[8]**

b) Write a program to find the larger of the two numbers stored in locations 0A00H and 0A01H and store it in a memory location 0A02H. **[8]**

<div align="center">OR</div>

Q8) a) Write a program segment to input 25 bytes of data from input port DATA and store them in a memory starting from address BUF. Use DO-WHILE structure. **[8]**

b) Explain with neat sketch the data logging system and computer supervisory control used for process control. **[8]**

Q9) a) Prepare a programmed ladder diagram to perform following sequence of operation : **[10]**

   i) Fill the tank.
   ii) Heat and stir the liquid at 100°C for 20 min. with timer tick 2 seconds.
   iii) Empty the tank.
   iv) Repeat from step (i).

b) Explain with suitable example the use of accumulating timer in PLC. **[6]**

OR

Q10) a) How would a derivative controller with $K_D = 4s$ responds to an error that varies as 3.6 sin (0.05t)? **[4]**

b) A liquid level system linearly converts a displacement of 2 to 3 m into 4 to 20 m A control signal. A relay serves as a two position controller to open or close an inlet valve. The relay closes at 12 mA and opens at 10 mA. Calculate the displacement gap in meters. **[4]**

c) Explain linear feedback control system. **[8]**

Q11) a) Derive an expression for the limiting velocity of escapement of the cylindrical workpiece through a slot. **[6]**

b) What factors should be considered while deciding the type of transfer device to be used in automated systems. **[6]**

c) Explain with neat sketch the application of controlled exit hopper. **[6]**

OR

Q12) Write short notes on : **[18]**

a) Turn table for orientation of workpiece.

b) Rotary transfer machine.

c) Design for automated assembly.

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[4064]-437

B.E. (Production Engineering)
OPERATIONS RESEARCH
(2008 Course) (411083) (Sem. - I)

Time : 3 Hours]   *[Max. Marks : 100*

Instructions to the candidates:

1) *Answer any three questions from each section.*
2) *Answers to the two sections should be written in separate books.*
3) *Neat diagrams must be drawn wherever necessary.*
4) *Figures to the right indicate full marks.*
5) *You are advised to attempt not more than three questions.*
6) *Use of logarithmic tables slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.*
7) *Assume suitable data, if necessary.*

SECTION - I

Q1) a) Express the linear programming problem in its general, canonical and standard forms. **[6]**

b) Use the two-phase method to **[10]**

Minimize $Z = x_1 + x_2$

Subject to $2x_1 + x_2 \geq 4,$

$x_1 + 7x_2 \geq 7,$

$x_1, x_2 \geq 0.$

OR

Q2) a) Write the dual of the following primal. **[4]**

Minimize $Z = 3x_1 - 2x_2 + 4x_3,$

Subject to $3x_1 + 5x_2 + 4x_3 \geq 7,$

$6x_1 + x_2 + 3x_3 \geq 4,$

$7x_1 - 2x_2 - x_3 \leq 10,$

$x_1 - 2x + 5x_3 \geq 3,$

$4x_1 + 7x_2 - 2x_3 \geq 2,$

$x_1, x_2, x_3 \geq 0.$

b) A pharmaceutical company produces two popular drugs A and B which are sold at the rate of Rs.9.60 and Rs.7.80 respectively. The main ingredients are x, y, and z and they are required in the following proportions : **[12]**

Drugs↓	x%	y%	z%
A	50	30	20
B	30	30	40

The total available quantities (gms) of different ingredients are 1600 in x, 1400 in y, and 1200 in z. The cost in Rs. of x, y, and z per gm are Rs.8, Rs.6 and Rs.4 respectively. Estimate the most profitable quantities of A and B to be produced using simplex method.

Q3) a) Explain the similarities and differences between the transportation and transshipment problem. **[6]**

b) Find the optimum solution to the following transportation problem in which the cells contain the transportation cost in rupees. **[12]**

	W1	W2	W3	W4	W5	Available
F1	7	6	4	5	9	40
F2	8	5	6	7	8	30
F3	6	8	9	6	5	20
F4	5	7	7	8	6	10
Required	30	30	15	20	5	100 (Total)

OR

Q4) a) State the common and distinguishing features of assignment model and write its applications. **[6]**

b) Consider the problem of assigning five operators to five machines. The assignment costs are given below : **[12]**

Operators

		I	II	III	IV	V
	A	10	5	13	15	16
Machines	B	3	9	18	3	6
	C	10	7	2	2	2
	D	5	11	9	7	12
	E	7	9	10	4	12

Assign the operators to different machines so that total cost is minimized.

Q5) a) Explain the concept of Gomory's cutting plane method. **[6]**

b) Solve the following mixed integer problem by the branch and bound technique. **[10]**

Maximize $Z = x_1 + x_2$,

Subject to $2x_1 + 5x_2 \leq 16$,

$6x_1 + 5x_2 \leq 30$,

$x_2 \geq 0, x_1 \geq 0$ *and int eger*.

OR

Q6) a) Mention the distinguishing characteristics of dynamic programming and explain Bellman's optimality principle. **[6]**

b) The owner of a chain of four grocery stores has purchased six crates of fresh strawberries. The following table gives the estimated profits at each store when it is allocated various number of boxes : **[10]**

Stores

		1	2	3	4
	0	0	0	0	0
	1	4	2	6	2
Number of boxes	2	6	4	8	3
	3	7	6	8	4
	4	7	8	8	4
	5	7	9	8	4
	6	7	10	8	4

The owner does not wish to split crates between stores, but is willing to make zero allocations. Find the allocation of six crates so as to maximize the profits.

SECTION - II

Q7) a) A system contains 10,000 resistors. When any resistor fails, it is replaced. The cost of replacing a resistor individually is Rs.1, if all the resistors are replaced at a same time, the cost per resistor is reduced to 35 paise. The per cent surviving at the end of month are given below : **[8]**

End of the month	0	1	2	3	4	5	6
Probability of failure during that month	0	0.04	0.06	0.25	0.30	0.15	0.20

What is the optimum replacement plan?

b) Explain the following Terms in "Games Theory" : **[8]**

    i)   Saddle Point.

    ii)   Maximin and Minimax Principle;

    iii)   Value of the Game;

    iv)   Two person zero sum game.

OR

Q8) a) A fleet owner finds from his past records that the costs per year of running a truck whose purchase price is Rs.6000 are as given below :**[8]**

Year	1	2	3	4	5	6	7
Running cost (in Rs.)	1000	1200	1400	1800	2300	2800	3400
Resale value (in Rs.)	3000	1500	750	375	200	200	200

Determine at what age is the replacement due.

b) Describe the following replacement policies : **[8]**

    i)   For items when money value remains constant.

    ii)   For items when money value changes with constant rate during the Period.

Q9) a) A branch of Punjab National Bank only one typist. Since the typist work varies in length (Number of pages to be typed), the typing rate is randomly distributed approximating a Poisson distribution with mean service rate of 8 letters per hour. The letters arrive at rate of 5 per hour during the entire 8 hour work day. If the typewriter is valued at Rs.1.5 per hour, determine : **[8]**

    i)   Equipment utilization.

    ii)   The percent time that an arrival letter has to wait.

    iii)   Average system time.

    iv)   Average cost due to waiting on the part of typewriter.

b) Derive an expression for optimal lot size and minimum average cost per unit time for demand rate uniform and production rate infinite. **[8]**

OR

Q10) a) Derive an expression for optimum lot size and total average cost per unit time for demand rate uniform and production rate finite. **[8]**

b) A person repairing radios finds that the time spent on the radio sets has been exponential distribution with mean 20 minutes. If the radios are repaired in the order in which they come in and their arrival is approximately poisson with an average rate of 15 for 8 hour day, what is the repairman's expected idle time each day? How many jobs are ahead of the average set just brought in? **[8]**

Q11) a) The following table lists the jobs of a network along with their time estimates : **[10]**

Job i - j	To	tm	tp
1 - 2	3	6	15
1 - 6	2	5	14
2 - 3	6	12	30
2 - 4	2	5	8
3 - 5	5	11	17
4 - 5	3	6	15
5 - 8	1	4	7
6 - 7	3	9	27
7 - 8	4	19	28

i)   Draw the project network?
ii)   Calculate the length and variance of the critical path?
iii) What is the probability that the jobs on the critical path will be completed in 40 days?
iv)   What is the probability that the jobs due date of 33 days?

Z	0.4	0.5	0.6	0.7	0.8	0.9
prob	0.65	0.691	0.725	0.75	0.78	0.815

b) Define the following : **[8]**

i)   Total float.
ii)   Free float.
iii) Independent float.
iv)   Earliest time.
v)   Latest time.
vi)   Slack.

<div align="center">OR</div>

Q12) a) Differentiate between CPM and PERT. What critical path means in project management? **[6]**

b) For the data tabulated below draw the network. Crash symmetrically the activities and determine the optimal project duration and cost. **[12]**

Activity	Normal		Crash	
	Time (days)	Cost Rs.	Time (days)	Cost Rs.
1 - 2	8	100	6	200
1 - 3	4	150	2	350
2 - 4	2	50	1	90
2 - 5	10	100	5	400
3 - 4	5	100	1	200
4 - 5	3	50	1	100

Indirect cost is Rs.70 per day.

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[4064]-439

B.E. (Production Engineering)
INDUSTRIAL ROBOTICS
(2008 Course) (411084 (B)) (Elective - I) (Sem. - I)

Time : 3 Hours]   *[Max. Marks : 100*

Instructions to the candidates:

1) *Answer any three questions from each section.*
2) *Answers to the two sections should be written in separate books.*
3) *Neat diagrams must be drawn wherever necessary.*
4) *Assume suitable data, if necessary.*

SECTION - I

Unit - I

Q1) a) Define Robot. Enlist the chronology of development process in each Robot Generation. **[9]**

b) With neat sketch explain robot anatomy. **[9]**

OR

Q2) a) Define Automation. Compare hard automation with soft automation.**[9]**

b) Explain six degrees of freedom associated with the robot manipulator.**[9]**

Unit - II

Q3) a) For the pick and place type of robot, the gripper is initially at location (60, 50, 80) and the following movements are in sequence. **[8]**

　i) Rotation about x axis by 90°
　ii) Translation along z by 30 units. Find the position of gripper with respect to the original system by using transformation matrix method.

b) Explain the forward kinematics associated with planar 3R manipulator.**[8]**

OR

Q4) a) List the steps involved in DH convention. **[8]**

b) Explain the Inverse kinematics associated with planar 3R manipulator.**[8]**

Unit - III

Q5) a) With neat sketches explain any two types of gripper mechanisms. **[8]**

b) Discuss the gripper design considerations in robotics. **[8]**

P.T.O.

OR

Q6) a) A 10Kg rectangular block is gripped in the middle and lifted vertically at a velocity 1m/s. If it accelerates at 27.5 m/s² and Coefficient of friction between gripping pads and block is 0.48. Calculate the minimum force that would prevent slippage. **[8]**

b) Describe : **[8]**

   i)   Vacuum gripper.
   ii) Magnetic gripper.

SECTION - II

Unit - IV

Q7) a) With neat sketch explain Proximity and Range Sensors used in robot. **[9]**

b) With the help of a block diagram, explain the functions of a robotic vision system and devices used in the same. **[9]**

OR

Q8) a) Describe Force and Torque sensors used in robot. **[9]**

b) The given data represents 8 × 8 arrays of pixels. Each element in the array indicates the grey level value of the pixels. **[9]**

   i)   Construct histogram for the array and obtain appropriate threshold value.
   ii) Convert the picture into a black and white image. The data is as :

10	11	10	11	12	12	12	12
13	15	17	17	17	17	15	13
14	17	19	19	19	19	18	14
13	17	19	20	20	19	18	13
12	17	19	20	21	19	18	12
12	17	19	19	19	19	18	12
11	15	18	18	18	18	15	11
12	11	10	11	12	12	12	12

Unit - V

Q9) a) Explain various programming methods used in robots. **[8]**

b) How intelligence can be incorporated in robots? **[8]**

OR

Q10) a) Explain the hydraulic system used for robot system with advantages and limitations. **[8]**

b) Explain 'WAIT', 'DELAY', 'SIGNAL', 'DEPART' commands with suitable example. **[8]**

Unit - VI

Q11) a) Describe the following applications of robot stating their configurations. **[8]**

   i) Spray Painting.

   ii) Machine Loading and unloading.

b) Explain the working of RS 232C interface used in Robotics system. **[8]**

OR

Q12) a) What is handshaking? Explain hardware handshaking of robot. **[8]**

b) Write a note on : **[8]**

   i) Walking Robot.

   ii) Distance Controlled Robot.

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[4064]-442

B.E. (Production Engineering) (S/W)
ERGONOMICS AND HUMAN FACTORS IN ENGINEERING
(2008 Course) (411085 (A)) (Sem. - I) (Elective - II)

Time : 3 Hours]   *[Max. Marks : 100*

Instructions to the candidates:

1) *Answer any three questions from each section.*
2) *Answers to the two sections should be written in separate answer books.*
3) *Neat diagrams must be drawn wherever necessary.*
4) *Figures to the right indicate full marks.*
5) *Assume suitable data, if necessary.*

SECTION - I

Unit - I

Q1) a) Explain objectives of Human Factors Engineering. **[6]**

   b) What are Human Machine Systems? Explain its types. **[6]**

   c) Explain characteristics of Human Machine Systems. **[6]**

OR

Q2) a) What is biomechanics? Explain in brief. **[6]**

   b) Explain Work and Rest Cycle. **[6]**

   c) Explain Design of MMH Task. **[6]**

Unit - II

Q3) a) What is Anthropometry and explain principles used in application of anthropometric data. **[8]**

   b) Explain the considerations in designing a seated workplace. **[8]**

OR

Q4) a) Explain use of anthropometric data in designing of interior of Passenger Car. **[8]**

   b) What are the requirements for designing safe product? **[8]**

P.T.O.

Unit - III

Q5) Explain arrangement of following components at work place (Any Four): **[16]**

    a) Visual displays.

    b) Control on panels.

    c) Hand controls.

    d) Two hand controls.

    e) Foot controls.

    f) Controls that require force.

<div align="center">OR</div>

Q6) Write short note on (Any Two) :   **[16]**

    a) Hand tool design.

    b) Functions of controls.

    c) Concept of visibility.

    d) Location of controls in work place.

SECTION - II

Unit - IV

Q7) a) Explain the system of measurement of light. Also explain use of lamps and lumanaries. **[9]**

    b) Explain Discomfort glare and Disability glare. **[9]**

<div align="center">OR</div>

Q8) a) What is Wet Bulb Globe Temperature? How do you calculate it? Explain its utility in hot humid conditions. **[9]**

    b) Explain the physiological effects of heat and cold. Explain its remedies. **[9]**

Unit - V

Q9) a) What are the characteristics of system design? Explain its any two phases. **[12]**

    b) Explain the significance of warnings in brief. **[4]**

<div align="center">OR</div>

Q10) a) Explain the term Accident. Explain its relationship with human errors. **[8]**

    b) Explain perception of risk and describe risk evaluation process. **[8]**

Unit - VI

Q11) a) Explain MOST and its types in brief. **[8]**

b) Explain the various considerations used in MTM 1. **[8]**

OR

Q12) Explain the following PMTS (Predetermined Motion Time Analysis) Determine the variants and stability of each : **[16]**

a) Work factor system.

b) Method Time measurement.

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[4064] - 480
B.E. (Electronics)
BIOMEDICAL INSTRUMENTATION
(2008 Course) (404204C)(Sem. - I)
(Elective - I)

Time : 3 Hours]   *[Max. Marks : 100*

Instructions to the candidates:
  1) *Answer any 3 questions from each section.*
  2) *Answers 3 questions from Section - I and 3 questions from Section - II.*
  3) *Answers to the two sections should be written in separate books.*
  4) *Neat diagrams must be drawn wherever necessary.*
  5) *Figures to the right indicate full marks.*
  6) *Use of logarithmic tables slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.*
  7) *Assume suitable data, if necessary.*

SECTION - I

Q1) a)   Explain different types of Electrodes for mesurement of bio-signal with their properties and the material used for the same.   **[10]**

   b)   Discuss most important factors to be considered in the design of medical instrumentation.   **[8]**

OR

Q2) a)   Write short note on active and passive transducer used for measurement of Bio signal.   **[10]**

   b)   Define Bio-eletric signal and give full expanded form of the following:
   i)   EEG   ii)   EMG   iii)   ERG   **[8]**
   iv)   PCG   v)   EOG   vi)   EGG

Q3) a)   Explain various EEG waveforms with their frequency and it's significance.   **[8]**

   b)   Name the different types of EMG. Explain the procedure to perform EMG with the help of neat block daigram.   **[8]**

OR

Q4) a) What are the different components of central nervous system? Explain in detail. **[8]**

b) Draw and explain 10-20 electrodes system for EEG Recording. **[8]**

Q5) a) Explain the cardio vascular system with the blood flowing through the heart. **[8]**

b) Draw the block diagram of ECG machine and explain working of diff. block. **[8]**

OR

Q6) a) Explain Einthoven triangle concept with necessory diagram. **[8]**

b) Lead I amplitude is = 5mm lead II = 9mm with calibration of 10 mm/ mv. Speed is 50 mm/sec Find lead III, aVR, aVL & aVF values. **[8]**

SECTION - II

Q7) a) Explain the necessity and functioning of pace marker. Discuss different type of batteries used in pace maker. **[8]**

b) Explain the working of DC defibrillator with circuit diagram and waveform. **[8]**

OR

Q8) a) What are the different methods of blood flow measurement explain any one with necessory diagram? **[8]**

b) Draw block and explain essential features of central monitoring system for an critical care unit in the Hospital. **[8]**

Q9) a) Explain the necessity of blood cell counting. Enlist various method of blood cell counting and explain coulter type blood cell counter for measurement of RBC's and WBC's. **[10]**

b) Describe the working of flame photometer. **[8]**

OR

*Q10)*a) Explain diff. grounding technique used in medical instruments. **[10]**

b) What is electronic stethoscope? What are it's advantages & disadvantages? **[8]**

*Q11)*a) Draw block diagram of MRI machine and describe how MRI scanner work. **[8]**

b) Explain how lasers are used in vision correction. **[8]**

OR

*Q12)*a) What are the advantages of CT scan over conventional x-ray imaging? Explain the principle of working of CT scan machine. **[8]**

b) Compare different types of lasers with wavelength and power output for diff. type of application in medical field. **[8]**

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[4064]-482

B.E. (Electronics)
ADVANCED COMPUTER ARCHITECTURE
(2008 Course) (Elective - II) (Sem. - I) (404204 (A))

Time : 3 Hours]   *[Max. Marks : 100*

Instructions to the candidates:

1) *Answer any three questions from each section.*
2) *Answers to the two sections should be written in separate books.*
3) *Figures to the right indicate full marks.*
4) *Assume suitable data, if necessary.*

SECTION - I

Q1) a) Explain in brief Flynn's classification and Fengs classification. **[10]**

     b) Write a short note on : Instruction level parallelism and thread level parallelism. **[8]**

OR

Q2) a) What is parallel processing? State applications of parallel processing. Briefly explain parallel processing application in weather forecasting.**[10]**

     b) Explain in brief Handlers classification and classification based on Grain size. **[8]**

Q3) a) State Key features of SPARC. Explain in brief register window structure of SPARC. **[8]**

     b) Explain various types of data hazards observed in pipeline processor. How those hazards could be detected and resolved. **[8]**

OR

Q4) a) Explain the following terms w.r.t pipeline processors : **[10]**

         i) Hazards.
         ii) Speedup.
         iii) Efficiency.
         iv) Internal forwarding and register tagging.

     b) Compare between : **[6]**

         i) Static and dynamic pipeline.
         ii) Unifunctional and multifunctional pipeline.

Q5) a) State characteristics of CRAY-1 computer system. Draw and explain the computation section of CRAY-1 vector processor. **[12]**

b) State advantages of vector processing over scalar processing. **[4]**

OR

Q6) a) What is vectorizing compiler? State any two vector optimizing functions. **[8]**

b) How vectorization works? Write a note on desirable features of parallel languages. **[8]**

SECTION - II

Q7) a) Explain static and dynamic network topologies used in interconnection networks. **[10]**

b) Explain the parallel sorting algorithm for array processors. **[8]**

OR

Q8) a) Explain the algorithm to compute Fast Fourier Transform for SIMD architecture. **[10]**

b) Explain the cobe inter connection network and hyper cobe interconnection network. **[8]**

Q9) a) Give a typical architecture for MPP. Explain in detail. **[10]**

b) What is COW architecture? Explain with diagram. **[6]**

OR

Q10) a) Explain in brief desirable processor characteristics for multiprocessor architecture. **[8]**

b) i) State features of IBM power 4 processor. **[8]**

ii) Explain chip multiprocessing.

Q11) a) Explain synchronous and asynchronous message passing in parallel programming. **[8]**

b) Explain : Data parallel programming. **[8]**

OR

Q12) a) Discuss in brief latency hiding techniques. **[8]**

b) State the following w.r.t. multithreading : **[2]**

i) Latency.

ii) Context switching overhead.

c) Using FORK and JOIN primitives explain shared memory parallel programming. **[6]**

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[4064]-483

B.E. (Electronics)

ENTREPRENEURSHIP & BUSINESS PLANNING

(2008 Course) (Elective - II) (Sem. - I)

Time : 3 Hours]   *[Max. Marks : 100*

Instructions to the candidates:

1) *Answer any three questions from each section.*
2) *Answer three questions from Section I and three questions from Section II.*
3) *Answers to the two sections should be written in separate answer books.*
4) *Neat diagrams must be drawn wherever necessary.*
5) *Figures to the right indicate full marks.*
6) *Use of logarithmic tables slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.*
7) *Assume suitable data, if necessary.*

SECTION - I

Q1) a) How are entrepreneurs different from employees.   **[4]**

  b) State advantages and disadvantages of entrepreneurship.   **[6]**

  c) Explain the steps in problem solving process.   **[8]**

OR

Q2) a) What are the basic rules to be followed in writing business letters. **[8]**

  b) Name one entrepreneur and describe what he or she did..   **[6]**

  c) Explain :   **[4]**
   i) Brainstorming
   ii) Consensus based decision making.

Q3) a) What is a Franchise? What are costs involved in purchasing and operating a Franchise? Also state advantages and disadvantages of owning a Franchise.   **[12]**

  b) Explain : Marginal Benefit and Marginal Cost.   **[4]**

OR

Q4) a) What steps should you take while purchasing a business.   **[6]**

  b) What is monopoly? How does a market economy differ from command economy.   **[6]**

  c) What is the difference between Fixed cost and Variable cost.   **[4]**

Q5) a) What is shoplifting? How can one protect their business from shoplifters. **[4]**

b) Write a short note on - Assets & Liabilities. **[4]**

c) Explain steps of Primary Market Research. **[8]**

OR

Q6) a) State advantages and disadvantages of Television and newspaper advertising. **[8]**

b) State some reasons bank may reject your loan application. **[4]**

c) What is a colateral? Explain secured loans and unsecured loans. **[4]**

SECTION - II

Q7) a) How can you motivate employees? Why should you delegate and listen to your employees. **[6]**

b) Explain any three types of nonsalary benefits your business might offer to employees. **[6]**

c) State various sources of recruitment. **[6]**

OR

Q8) a) What is an income statement? Explain the four parts of the income statement. **[10]**

b) What are the different training techniques. **[4]**

c) Explain evaluation procedure with an example. **[4]**

Q9) a) Explain Break even analysis with a suitable graph. **[8]**

b) Explain types of professionals that provide financial management services. Also state how to choose a financial advisor. **[8]**

OR

Q10) a) What are the advantages of using e-mail and world wide web. State some of the things your website should include. **[10]**

b) Explain the services provided by financial experts. **[6]**

Q11) a) What are responsibilities entrepreneurs have to suppliers, customers and community. **[8]**

b) What are the laws that protect rights of employees. **[8]**

OR

Q12) a) Write a short note on : Business Ethics. **[8]**

b) What factors should you consider before deciding to expand your business. **[5]**

c) How can lawyers help you in your business. **[3]**

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[4064]-496

B.E. (E & TC)
INDUSTRIAL DRIVES AND CONTROL
(2008 Course) (404184 C) (Sem. - I) (Elective - I)

Time : 3 Hours] *[Max. Marks : 100*

Instructions to the candidates:

1) *Answer Q. 1 or Q. 2, Q. 3 or Q. 4, Q. 5 or Q. 6 from section-I and Q. 7 or Q. 8, Q. 9 or Q. 10, Q. 11 or Q. 12 from section-II.*
2) *Answers to the two sections should be written in separate books.*
3) *Neat diagrams must be drawn wherever necessary.*
4) *Figures to the right indicate full marks.*
5) *Use of logarithmic tables, slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.*
6) *Assume suitable data, if necessary.*

SECTION - I

Q1) a) With the help of a neat circuit diagram and relevant waveforms, explain the operation of a 3-phase fully controlled bridge converter operating with a highly inductive load. Derive the expression for average output voltage. Plot the variation of this average output voltage with reference to the firing angle. **[12]**

b) Draw the circuit diagram and explain with the help of relevant waveforms the operation of a single-phase dual converter with circulating current.**[6]**

OR

Q2) a) With the help of a neat circuit diagram, waveforms and mathematical expressions, explain the effect of source impedance on the performance of a single phase full converter. **[10]**

b) Explain the operation of a four quadrant chopper in detail. Mention its applications. **[8]**

Q3) a) State various harmonic reduction techniques used in inverters. Explain any one efficient technique in details. **[8]**

b) Compare switch mode and resonant inverters. Mention types of resonant inverters. **[8]**

OR

Q4) a) With the help of a neat circuit diagram and relevant waveforms, explain the operation of a 3-phase voltage source bridge inverter operating with 180° conduction mode. Assume 3-phase star connected balanced resistive load. Write the equation for any one line voltage. **[12]**

b) What are cycloconverters? Mention their types. What are the applications of cycloconverters? **[4]**

Q5) a) The speed of a 10HP, 230V, 1200 rpm separately excited DC motor is controlled by a single-phase full converter. The rated motor armature current is 38A and armature resistance is $0.3\,\Omega$. The ac supply voltage is 1φ, 260V, 50 Hz. The motor voltage constant is $K_a\varphi = 0.182$V/rpm. Assume that the motor current is continuous and ripple-free. For a firing angle of 30° and rated motor current, calculate the motor torque, speed and supply power factor. **[8]**

b) What is braking? What are various braking techniques for DC machines? Explain any one braking technique in detail. **[8]**

OR

Q6) a) With the help of a neat circuit diagram and necessary waveforms, explain the operation of reversible DC drive which uses armature current reversal technique. The armature is connected to a 3-phase dual converter. **[10]**

b) What is the necessity of field failure protection for a DC motor? With the help of a neat circuit diagram, explain a simple field failure protection circuit. **[6]**

SECTION - II

Q7) a) With the help of the torque speed characteristics of an induction motor, explain the various regions of its operation. **[6]**

b) Draw the circuit diagram and explain the operation of slip power recovery system using Static Scherbius system. **[8]**

c) Explain the necessity of soft start in induction motors. Explain a simple method to provide soft start. **[4]**

OR

Q8) a) A three phase, 4 pole, 1440 rpm 50 Hz induction motor is operating under constant V/f control. Assuming the speed-torque curves for various frequencies for low slips to be parallel straight lines, calculate : **[8]**

    i) Speed for a frequency of 30 Hz and 80% full load motoring torque.

    ii) Frequency for a speed of 1000 rpm and 100% full load braking torque.

b) Discuss the variable frequency control method of an induction motor. Also explain the operation for the following modes : **[10]**

    i)   Operation below the rated frequency.

    ii)   Operation above the rated frequency.

Q9) a) Explain the operation of a cylindrical rotor synchronous motor in brief. Also derive the expression for field excitation. **[8]**

b) With the help of a neat circuit diagram and necessary waveforms, explain the operation of a three-phase brushless DC motor drive. **[8]**

OR

Q10) a) Explain the operation of a switched reluctance motor. Why is it preferred as a adjustable speed drive? **[8]**

b) What is a stepper motor? Mention various types of stepper motor. Enlist the applications of stepper motors. Explain the operation of any one stepper motor driver. **[8]**

Q11) a) Explain AC traction motor drive in detail. **[8]**

b) Mention various types of power line disturbances. Explain the sources of these disturbances. Mention the preventive measures for these disturbances. **[8]**

OR

Q12) a) Explain the operation of a fuzzy logic based induction motor speed control system. **[10]**

b) Write a short note on Energy Audit. **[6]**

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[4064]-498
B.E. (E & TC)
ENTREPRENEURSHIP DEVELOPMENT
(404185(A)) (Elective - II) (2008 Course) (Sem. - I)

Time : 3 Hours]   *[Max. Marks : 100*

Instructions to the candidates:

1) Answer 3 questions from Section - I and 3 questions from Section - II.
2) Answers to the two sections should be written in separate answer books.
3) Neat diagrams must be drawn wherever necessary.
4) Figures to the right indicate full marks.
5) Assume suitable data, if necessary.

SECTION - I

Q1) a) What is entrepreneurship? State advantage & disadvantages of entrepreneurship. **[8]**

     b) What are six steps in problem solving process? **[8]**

OR

Q2) a) Explain different kinds of entrepreneural business. **[8]**

     b) Explain the basic rules to be followed in writing business letters. **[8]**

Q3) a) What are advantages & disadvantages of buying an existing business?**[9]**

     b) What do you mean by a frachisee? What are costs involved in purchasing and operating franchisee? **[9]**

OR

Q4) a) Explain Demand supply curve in market economy? **[6]**

     b) What are some of the advantages and disadvantages of entering family business? **[6]**

     c) State advantages and disadvantages of starting your own business?**[6]**

Q5) a) What is a Business plan? State the importance of a Business plan? **[8]**

     b) Explain five steps of primary market research. **[8]**

OR

Q6) a) Name & explain three methods of determining prices. **[8]**

     b) Explain five basic elements of a Business plan. **[8]**

SECTION - II

Q7) a) Specify six ways you can Recruit employees. **[6]**

b) List the types of nonsalary benefits your business might offer. **[6]**

c) Specify any six leadership characteristics. **[6]**

OR

Q8) a) Explain the evaluation procedure with a suitable example. Also specify advantage of evaluating employees. **[8]**

b) What are four main parts of an income statement? **[6]**

c) Explain organization structure with an example. **[4]**

Q9) a) Explain services provided by financial experts. **[8]**

b) Enlist and explain briefly technological items that might be used in business. **[8]**

OR

*Q10)*a) What are ways to improve your cash flow? **[8]**

b) Short note : Break even analysis. **[8]**

*Q11)*a) State laws that protect businesses & customers? **[8]**

b) What are responsibility entrepreneurs have to suppliers customers & community? **[8]**

OR

*Q12)*a) Write a short note on : Business ethics and social responsibility. **[8]**

b) What factors should you consider before deciding to expand your business? Why is it important to control the growth of your business?

[8]

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[4064]-499

B.E. (E & TC)
JOINT TIME FREQUENCY ANALYSIS
(2008 Course) (Elective - II) (404185(B)) (Sem. - I)

Time : 3 Hours]   *[Max. Marks : 100*

Instructions to the candidates:

    1)   *Answer three questions from Section I and three questions from Section II.*

    2)   *Answers to the two sections should be written in separate answer books.*

    3)   *Neat diagrams must be drawn wherever necessary.*

    4)   *Figures to the right indicate full marks.*

    5)   *Use of logarithmic tables slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.*

    6)   *Assume suitable data, if necessary.*

SECTION - I

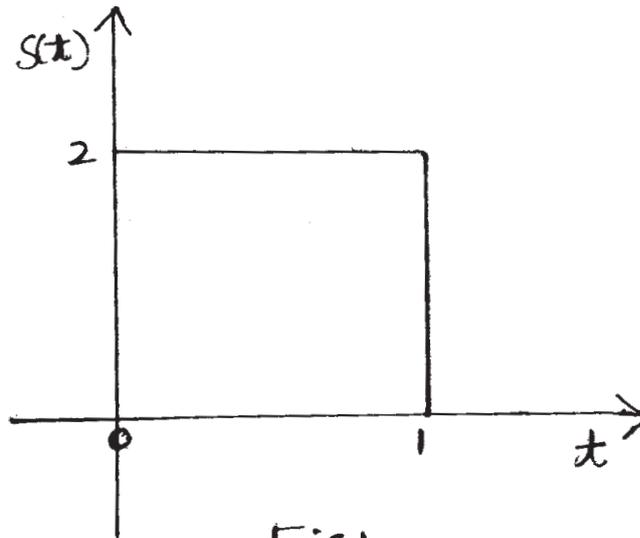**Q1)** For the given signal shown in Fig 1 find $\rightarrow$ **[18]**

Fig 1

    a)   Fourier transform.

    b)   Average time.

    c)   Standard deviation

    d) $< S(t).S(t) >$

    e)   The orthogonal projection of $S(t)$ on subspace V_{-1}.

    f)   The orthogonal projection of $S(t)$ on subspace W_1.

    g)   The subspace of $S(t)$. Give the reasons for the same.

OR

Q2) Write notes on : [18]

   a) STFT.

   b) Uncertainity principle.

   c) Hilbert transform.

Q3) a) Signal $x[n] = \{\overset{\uparrow}{8}, 6, 4, 2\}$ belongs to subspace V_2. Decompose $x[n]$ till V_0 subspace using Harr Wavelet packets. Clearly show the reconstruction of the signal by drawing the waveforms of the wavelet packets used in the subspace V_0. [10]

   b) Find the analytic signal and the instantaneous frequency of [6]
   $g(t) = \cos 20t . \cos 100t$

<div align="center">OR</div>

Q4) a) Explain the difference between tilings of wavelet packet and local cosine basis with reference to the time frequency plane. [10]

   b) Define Instantaneous frequency. Also explain the method of finding it. [6]

Q5) a) Give MRA axioms. [8]

   b) Derive the alias cancellation condition for 2-Band Harr filter bank. Also give the transfer functions of LPF & HPF. used in analysis and synthesis section [8]

<div align="center">OR</div>
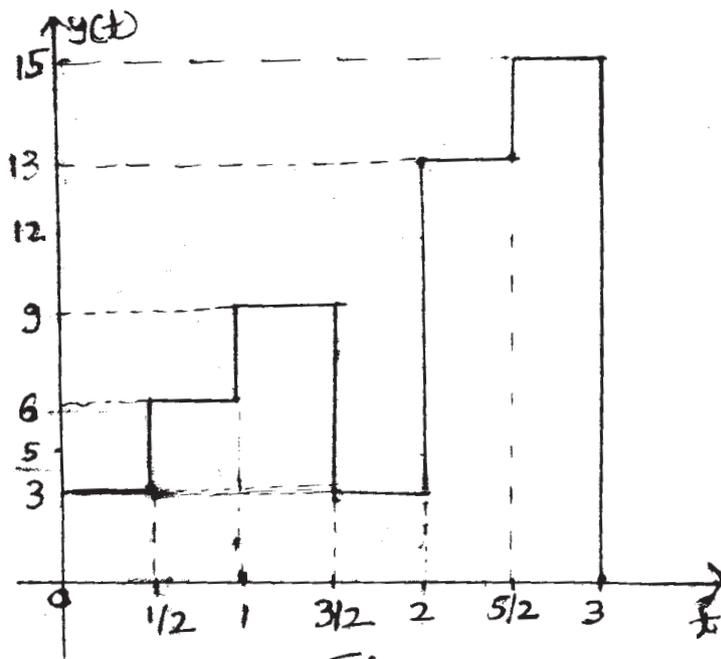
Q6) For the signal $y(t)$ shown in Fig 2.

Fig 2

a) State which V subspace $y(t)$ belongs to and why. **[2]**

b) Calculate the piecewise constants such that $y(t)$ belongs to V_0 and W_0 subspace. **[3]**

c) Using Harr $\phi(t)$ plot projections and span of $y(t)$ on V_0 and using Harr $\psi(t)$ plot projections and span of $y(t)$ on W_0. **[3]**

d) Reconstruct the original signal. Show that $V_1 = V_0 \oplus W_0$ **[4]**

e) Derive the magnitude and phase response of HPF used in the analysis section. **[4]**

SECTION - II

Q7) Explain the design of Daubechies-4 filter. Clearly state the constraints/assumptions used in finding filter coefficients. **[16]**

OR

Q8) Write notes on : **[16]**

a) Shanon Wavelet.

b) Meyer Wavelet.

c) Battle-Lemarie Wavelets.

Q9) a) Using Lifting Scheme decompose the signal $x[n] = \{\underset{\uparrow}{1},2,3,1,4,5,6,1\}$ till V_0 subspace. The given signal belongs to the subspace V_3. Clearly show the in place computations. Also show the reconstruction. **[14]**

b) Explain the need of biorthogonal wavelet system by stating the advantage of it over Daubechies wavelet system. **[4]**

OR

Q10) a) Explain the steps involved in bi-orthogonal 5/3 tap design. **[12]**

b) Write a note on : Wavelet packet trees. **[6]**

Q11) a) Explain the need for joint time frequency analysis. Also with example explain the use of time frequency distributions in it. **[10]**

b) Explain audio compression application using wavelets. **[6]**

OR

Q12) Write notes on : **[16]**

a) Scalograms.

b) Image compression as a JTFA application.

c) Signal denoising.

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[4064]-501

B.E. (E&TC)

MOBILE COMMUNICATION

(404185(D)) (2008 Pattern) (Elective - II) (Sem. - I)

Time : 3 Hours]   *[Max. Marks : 100*

Instructions to the candidates:

1)   *Attempt three questions from Section - I and three questions from Section - II.*

2)   *Answers to the two sections should be written in separate books.*

3)   *Neat diagrams must be drawn wherever necessary.*

4)   *Figures to the right indicate full marks.*

5)   *Use of logarithmic tables slide rule, mollier charts, electronic pocket calculator and steam tables is allowed.*

6)   *Assume suitable data, if necessary.*

SECTION - I

Q1) a)   Explain co-channel interference and Adjacent channel Interference and how to reduce it.   **[9]**

b)   What is hand off mechanism? and explain practical hand off considerations.   **[9]**

OR

Q2) a)   Enlist techniques of improving coverage and capacity of cellular networks and explain any two in detail.   **[9]**

b)   Discuss third Generation (3G) wireless cellular networks.   **[5]**

c)   If a total of 33 MHz of bandwidth is allocated to a particular FDD cellular telephone system which uses two 25 kHz simplex channels to provide full duplex voice and control channels, compute the number of channels available per cell if a system uses   **[4]**

i)   12 cell reuse   ii)   7 cell reuse.

Q3) a)   Describe factors influencing small scale fading.   **[8]**

b)   If a transmitter produces 50W of power, express the transmit power in units of i) dBm and (ii) dBW. If 50W is applied to unity gain antenna with a 900 MHz carrier frequency, find the received power in dBm at a free space distance of 100 m from antenna. What is Pr (10 km)? Assume unity gain for receiver antenna.   **[8]**

Q4) a) Explain impulse response model of multipath channel. **[8]**

   b) Explain in detail all types of small scale fading. **[8]**

Q5) a) Explain with block diagram Direct Sequence spread spectrum (DSSS) technique. **[8]**

   b) How to provide equalization in mobile communication and explain performance of equalizers for the same. **[8]**

OR

Q6) a) Explain concept of diversity and its types for mobile communication. **[8]**

   b) With suitable block diagram explain Quadrature phase shift keying and compare with offset QPSK. **[8]**

SECTION - II

Q7) a) Discuss packet Radio and different protocols used for it. **[10]**

   b) Discuss vocoders with its types. **[8]**

OR

Q8) a) Compare FDMA, TDMA and CDMA. **[10]**

   b) Which are the criterias for selection of speech codecs for mobile communication. **[8]**

Q9) a) Describe GSM reference model with block diagram. **[8]**

   b) Explain steps involved in Intra-MSC handover. **[8]**

OR

Q10) a) Enlist coding mechanisms used for GSM and explain any one of them in detail. **[8]**

   b) Explain teleservices and supplementary services for GSM. **[8]**

*Q11)*a) Explain classification of IS95 logical channels and explain any two in detail. **[8]**

b) Explain need of power control and how power is controlled in CDMA.

[8]

OR

*Q12)*a) Give properties of maximum length pseudorandom sequence.   **[8]**

b) Describe different types of Handoffs.   **[8]**

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[4064] - 512

B.E. (Instru. & Control)
ENVIRONMENTAL INSTRUMENTATION
(Sem. - I) (2008 Course) (406265A) (Elective - II)

Time : 3 Hours]   *[Max. Marks : 100*

Instructions to the candidates:

1)   Neat diagrams must be drawn wherever necessary.

2)   Figures to the right indicate full marks.

3)   Your answers will be valued as a whole.

4)   Assume suitable data, if necessary.

SECTION - I

Q1) a)   Explain the necessity of instrumentation & control for environment.**[8]**

b)   Explain the Gas chromatography method used in environmental analysis.   **[10]**

OR

Q2) a)   Discuss on the sensor requirements for environment.   **[8]**

b)   What are the different portable and stationary analytical instruments. Compare portable & stationary analytical instruments.   **[10]**

Q3) a)   Discuss on water quality standards.   **[8]**

b)   Explain process design for water treatment in detail.   **[8]**

OR

Q4) a)   Explain different types of pH analysers & their applications in water treatments.   **[8]**

b)   Explain conductivity analysers and their applications in water quality parameterization.   **[8]**

Q5) a) What is flotation? Explain its types in brief. **[8]**

b) Explain different level measurements devices in groundwater monitoring. **[8]**

OR

Q6) a) Derive the equation for settling of discrete particles in sedimentation process. **[8]**

b) Discuss on instrumentation in ground water monitoring. **[8]**

SECTION - II

Q7) a) With a neat sketch of automatic wastewater sampling system, explain sample intake, transport & delivery subsystem. **[8]**

b) Give the general guidelines for choosing optimum sampling locations. **[8]**

OR

Q8) a) List the different level measurement techniques in wastewater treatment. Explain differential pressure sensors. **[8]**

b) With a neat diagram explain instrumentation setup for wastewater treatment plant. **[8]**

Q9) a) What are the different control measures used for air pollution. Explain any one in detail. **[10]**

b) Define air sampling. What are the different air sampling methods. Explain any one in detail. **[8]**

OR

*Q10)*a) Discuss on the air pollution from thermal power plant, their characteristics & control measures. **[10]**

b) What are the different analytical methods for air pollution studies. Explain any one in detail. **[8]**

*Q11)*a) Write a note on Rain water harvesting its necessity and different methods. **[8]**

b) Discuss on non-open channel flow measurements. **[8]**

OR

*Q12)*a) Discuss on various devices used for air flow measurements. **[8]**

b) Explain open channel waste water flow measurements. **[8]**

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[4064] - 547

B.E. (Petroleum)
WELL ENGINEERING AND DESIGN
(412383) (2008 Course) (Sem. - I)

Time : 3 Hours]   *[Max. Marks : 100*

Instructions to the candidates:

1) *Answers 3 questions from Section - I and 3 questions from Section - II.*
2) *Answers to the two sections should be written in separate books.*
3) *Neat diagrams must be drawn wherever necessary.*
4) *Figures to the right indicate full marks.*
5) *Use of logarithmic tables slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.*
6) *Assume suitable data, if necessary.*

SECTION - I

Q1) a) Show that formation pressure art 7000 ft is abnormal due to gas cap effect. Well data given as Formation pressure gredient at 8000 ft is 0.465 psi/ft Gas gredient 0.1 psi/ft, Height of gas cap = 1000 ft.   **[2]**

b) Calculate D exponent   **[2]**

Bit diameter = 12.25", wt. on bit = 50,000 lb RPM = 80, ROP = 30 ft/hr.

c) Calculate kick tolerence   **[8]**

Well data is

12.25" hole TD = 13, 123 ft

BHA = 697 ft × 8" D/C (drill collar)

Drill pipe = 5", Mud weight = 13.2 ppg

Previous Casing shoe = 8842 ft

LOT at shoe 14.3 ppg EMW

Assume 150 psi safety margin.

d) Discuss objective and input data of well planning in brief.   **[6]**

OR

Q2) Using graphical method find out length of each grade in combination string of casing. **[18]**

well data :

Casing size = 13.375 inch, drift diameter = 12.25"

Depth = 3000ft, casing seat fracture gredient = 13.6 ppg, safety factor collapse & burst = 1.1 cement data

0 – 2700 ft 12.4 ppg slurry weight

2700 – 3000 ft 15.6 ppg slurry weight

Gas gredient = 0.115 psi/ft

Casing grade used are

a) K 55, 54.5 ppf Burst pressure = 2730 psi

Collapse pressure = 1130 psi, yield strength = 55,000 psi

Wall thickness = 0.380 inch.

b) S 80, 68 ppf, Burst pressure = 3450 psi

Collapse pressure = 2850 psi yield strength = 55,000 psi

Wall thickness = 0.480 inch.

Also check tension criterea.

Q3) a) A J type profile is planned for the following well V_t = 6000 ft, H_t = 1800 ft, Buidup rate = 2.50° per 100 ft calculate koP, the final inclination and total depth of well. **[8]**

b) Derive expression for bending force exerted on a casing in a directional well is F.B. = 63 D W_n θ **[8]**

D - Diameter of the casing

W_n - Weight of the casing

θ - Rate of change of angle per 100 ft.

OR

Q4) a) Write short note on : **[8]**

i) Rotary steerable system.

ii) Anticollision planning.

b) Explain minimum curvature directional survey method. Find out ΔV, ΔN and ΔE **[8]**

Data given :

Measured Depth (M)	Inclination °(α)	Azimuth °(β)
2000	2.0	45
2090	4.5	50

Q5) a) With the following data calculate the number of stands that can be pulled out dry before well starts to flow **[8]**

Well depth = 8552 ft, shoe depth = 5020 ft

Mud weight = 13.6 ppg, Pore pressure gredient = 0.685 psi/ft

Casing capacity = 0.147 bbl/ft,

Open hole capacity = 0.138 bbl/ft

D/P metal displacement = 0.0082 bbl/ft

Average stand length = 90.00 ft

b) Discuss wait and weight method of well control and advantages over driller's method. **[8]**

OR

Q6) a) The casing is set at 1500 ft and the fracture gredient below the shoe is 0.68 psi/ft what is the maximum pressure that can be closed in, if a 9 ppg mud is being used to drill with? **[3]**

b) A well has 14 ppg mud and it is loosing mud at a the rate of 7 bbl/hrs. What will be the reduction in BHP after 2 hrs if annulus capacity is 0.0355 bbls/ft (assume pipe is full of mud). **[3]**

c) In a BOP stack with one annular, three rams an HCR on the kill line and HCR on choke line. The following volumes are required. **[5]**

Annular 31.1 (close) 31.1 (open)

Ram 24.9 (close) 23.0 (open)

HCR 02.0 (close) 02.0 (open)

The operator's requirement as per API RP 53 is for a minimum operating pressure of 1200 psi (Precharge pressure = 1000 psi, max operating pressure = 3000 psi).

How many 10 gallons capacity accumulator bottles are required to provide enough usable fluid as per API RP 53?

d) Discuss sizing of accumulator system using Boyle's law. **[5]**

SECTION - II

Q7) a) Discuss different steps involved while plotting break even chart to compute loss during drilling operation. **[8]**

b) Discuss different costs in AFE calculations. **[8]**

OR

Q8) a) In conventional rotary method rock bit cost = $3500 drilled 350 ft in 15 hours In the same formation a turbine with a PDC bit cost = $ 40,000 drilled 2000 ft in 40 hours, cost of turbine = $200 per hour, cost of rig $1500 per hour, trip time 5 hours for both runs. Find out cost effective bit. **[6]**

b) Explain liner cementation with suitable sketch. **[8]**

c) What is cycle speed and commercial speed. **[2]**

Q9) Determine bit nozzle size for maximum jet impact force for the next bit run. The bit currently in use has 3(13/32)" nozzles, mud weight = 9.66 ppg, flow rate of 485 gpm 2800 PSi is observed. When pump is slowed to a rate of 247 gpm, 900 psi pressure is observed the pump is rated at 1250 HP and has efficiency 0.92. The q minimum to lift the cutting is 225 gpm. The maximum allowable surface pressure is 3000 psi. Mud density will remain unchanged in the next bit run. C_d = 0.95 USE LOG-LOG-PAPER. **[18]**

OR

Q10) a) Discuss field method of optimizing bit hydraulics. **[5]**

b) Discuss headstrom number and Renold number. **[5]**

c) Calculate friction pressure for flow rate 100 gpm use binghum model pipe I.D = 3.5 in Mud weight = 12.9 ppg **[8]**

P_V = 29 cp, y_p = 6 lb/100 ft², length = 10,000 ft FOR N(HE) = 41826 Critical Renold number = 5000

*Q11)*a) Discuss drill string design on the basis of **[8]**
    i)   Collapse   ii)   Tension
    iii) Bending   iv)   Torque

b) Determine maximum dog leg severity acceptable is $C = \dfrac{108,000}{\pi\,L}\dfrac{F}{T}$ **[4]**

F = 2,000 lb T = 275,000 lb L = 180

While drilling dog leg encountered is 6°/100 ft

Discuss different drilling problems.

c) Calculate buoyancy factor for mud weight 9, 11, 13, 15 ppg. **[4]**

OR

*Q12)*a) Show that the active length of drill collar in directional well is **[12]**

$$l = 2\sqrt{\dfrac{R_y L}{q_1}}$$

l - active length of drill collar R_y-side force at bit
L - length of turbine $q_1 = q\,\sin\alpha$.

b) Find section modulus at **[4]**

9.5" × 3" Drill collar and 8.5" × 3" Drill Collar Joint.

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[4064]-549

B.E. (Petroleum)

ADVANCED INSTRUMENTATION AND PROCESS CONTROL IN PETROLEUM INDUSTRY

(Elective - I) (412384-B) (2008 Course) (Sem. - I)

Time : 3 Hours]   *[Max. Marks : 100*

Instructions to the candidates:

1) Answer 3 questions from each section.

2) Answers to the two sections should be written in separate answer books.

3) Figures to the right indicate full marks.

4) Use of logarithmic tables, slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.

5) Assume suitable data, if necessary.

SECTION - I

Q1) a)   Compare between analog and digital instruments.   **[8]**

b)   Discuss the various gate circuits.   **[8]**

OR

Q2) a)   Enlist the various methods of speed control for d.c. motors. Write a note on the Ward Leonard method of speed control.   **[10]**

b)   An eight-pole alternator supplies power to a four pole, three phase induction motor. The alternator is driven at 750 rpm. If the induction motor runs at 1470 rpm, determine the slip of the induction motor.**[6]**

Q3) a)   Which are the various specific gravity measuring methods? Explain any one in detail.   **[8]**

b)   Give the principle, construction and working of an optical pyrometer.

[8]

OR

Q4) a) Give the principle of operation of each of the following devices : **[8]**
   i) Rotameter.   ii) Thermocouple.
   iii) LVDT.   iv) Capacitance type level gauge.

b) Explain in detail the method of measurement of pressure inside closed vessels like boilers. **[8]**

Q5) a) Discuss importance and usefulness of Process Control - Explain with help of suitable example. **[6]**

b) Develop the mathematical expression of the following system. Obtain overall transfer function and discuss the dynamics of the system. **[8]**
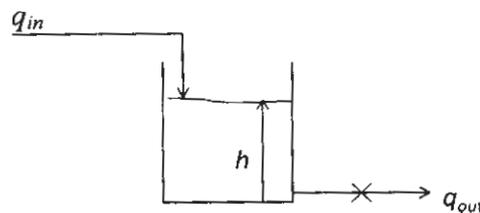
c) What type of controller are suitable for following purposes : **[4]**
   i) Flow Control.   ii) Temperature Control.

OR

Q6) a) Compare Proportional, PI and PID controller and indicate their properties along with their mathematical expressions. **[6]**

b) Discuss in details the procedure and precautions of Zeigler Nichol controller tuning method. **[6]**

c) Define following with help of neat diagrams : Overshoot, Response Time, Damping factor. **[6]**

SECTION - II

Q7) a) Explain the need of oilfield automation and discuss its present status.**[6]**

b) Why does the accuracy and reliability worsen in real world processes compared to systems analyzed in laboratory? **[6]**

c) How can user-defined quality impact the error in Natural Gas custody transfer? **[6]**

OR

Q8) a) Explain Cascade Control Scheme for a shell and tube heat exchanger. **[6]**

b) Discuss the importance of pressure relief system and highlight its general design procedure. **[8]**

c) Oil and water are to be separated based on their differences in density. Develop a programmable logic control (PLC) strategy for this industrially important process. **[4]**

Q9) a) With help of neat block diagram explain dynamic positioning of floating vessels in deep sea operations. **[8]**

b) What are the design goals of automated and remotely controlled fracturing process? Discuss all elements of the system along with neat diagram. **[8]**

OR

Q10) a) What is kick, how is it detected while drilling? **[4]**

b) With help of neat sketch explain the implementation of control strategy of dynamic positioning of floating vessels in deep sea. **[8]**

c) Write a short note on SCADA based UBD. **[4]**

Q11) a) List out important characteristics of ideal multiphase flow meter. **[4]**

b) Name various types of multiphase meters used by oil industries and discuss any one of them in depth along with its operational procedure. **[8]**

c) What is emergency shutdown system? Highlight its features and benefits. **[4]**

OR

Q12) a) What are the technical challenges in subsea manifold wells? Discuss its possible solutions. **[8]**

b) With help of schematic diagram explain integrated flow assurance control highlighting PMS system and Slug Control. **[8]**

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[4064]-552
B.E. (Petroleum)
PETROLEUM REFINING TECHNOLOGY
(Elective - II) (412385(A)) (2008 Course) (Sem. - I)

Time : 3 Hours]   *[Max. Marks : 100*

Instructions to the candidates:

  1)   *Answer 3 questions from each section.*

  2)   *Answers to the two sections should be written in separate answer books.*

  3)   *Figures to the right indicate full marks.*

  4)   *Use of logarithmic tables slide rule, Mollier charts, electronic pocket calculator and steam table is allowed.*

  5)   *Assume suitable data, if necessary.*

SECTION - I

Q1) a)   Write a note on the Nelson Complexity Factor for a refinery.   **[6]**

     b)   Explain the following terms :   **[6]**

         i)   Reid Vapour Pressure.

         ii)   UOP/Watson Characterization Factor.

         iii)   Smoke Point.

     c)   Write a note on ASTM distillation.   **[6]**

<p align="center">OR</p>

Q2) a)   Give the classification of crude oil.   **[6]**

     b)   Draw a neat labeled diagram of the overall refinery flow.   **[6]**

     c)   What are the various low boiling products in a refinery?   **[6]**

Q3) a)   Describe the electrostatic process for the refining of crude oil.   **[8]**

     b)   Discuss with diagrams the various methods of reflux in an atmospheric distillation column.   **[8]**

OR

Q4) a) Discuss regarding the wet, dry and damp operations of a vacuum distillation unit. Also discuss the need for introduction of steam in the VDU operation. **[8]**

b) Enlist the various crude distillation products. **[8]**

Q5) a) Explain the delayed coking process with the help of a neat diagram.**[8]**

b) What are the various catalytic cracking processes in use today? Discuss any one. **[8]**

OR

Q6) a) Explain the need for hydrocracking process. Also discuss the advantages of the same. **[8]**

b) Write a note on petroleum coke. Give the uses of petroleum coke. **[8]**

SECTION - II

Q7) a) Give the significance of catalytic reforming. Also give the reactions that take place in catalytic cracking. **[8]**

b) Discuss the hydrofluoric acid process for alkylation. **[8]**

OR

Q8) a) Discuss the isomerization process to increase the octane number. **[8]**

b) Write a note on the reforming catalysts. **[8]**

Q9) a) Discuss a typical propane deasphalting unit. **[8]**

b) How is dewaxing of lube done with ketone? **[8]**

OR

*Q10)*a) With the help of a neat diagram explain the NMP extraction process.**[8]**

b) What are the important properties considered for lube oil base stock? Explain. **[8]**

*Q11)*a) Explain the process of hydrogen production from steam reforming.**[10]**

b) Discuss the once through Claus process for sulphur recovery from refinery gases. **[8]**

OR

*Q12)*a) What are the typical sources of wastewater in refineries? How is the treatment done? **[10]**

b) Write a note on batch blending and line blending operations. **[8]**

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[4064] - 562

B.E. (Petrochemical)

PROCESS DYNAMICS AND CONTROL

(412402) (2008 Course) (Sem. - I)

Time : 3 Hours]   *[Max. Marks : 100*

Instructions to the candidates:

1) *Attempt Q1 or 2, Q3 or 4, Q5 or 6, Q7 or 8, Q9 or 10, Q11 or 12.*
2) *Answers to the two sections should be written in separate books.*
3) *Figures to the right indicate full marks.*
4) *Use of logarithmic tables slide rule, Mollier charts, electronic pocket calculator and steam table is allowed.*
5) *Assume suitable data, if necessary.*

SECTION - I

Q1) a) Explain the Hierarchy of process control activities with functions of each level and its time scales. **[8]**

b) What do you mean by model degrees of freedom and control degrees of freedom? Develop a model and perform the degrees of freedom analysis on a constant hold up stirred tank heating process. **[8]**

OR

Q2) a) Discuss with suitable examples the guidelines for selection of controlled, manipulated and measured variables in control system design. **[8]**

b) Define mathematically the standard process input functions along with its Laplace transform. Give suitable example of each. **[8]**

Q3) a) In a mixing tank the feed rate of solution is 1.5 m^3/min and the volume at tank is 1.5m^3. The steady state concentration is 0.03 k mol/m^3. The inlet concentration of the feed is increased to 0.08 k mol/m^3. After 0.55 min, the concentration of the feed is decreased to 0.035 k mol/m^3. Calculate the concentration of the solution for t = 0.1 min, t = 0.55 min and t = 1.5 min. **[6]**

b) Explain with neat figure the characteristics of a second order under damped system for a step change. **[6]**

c) Explain the significance of deriving a transfer function of a process model. **[4]**

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OR

Q4) a) Discuss how the transportation lag parameter can be minimized in the chemical industry. Give its effects on the complexities of the control system. **[8]**

b) Discuss the importance of linearization of non-linear model equations in process dynamics. **[8]**

Q5) a) A liquid level control system can be configured in either two ways : with a control valve manipulating flow of liquid into the holding tank as shown in Figure A. The other way is with a control valve manipulating the flow of liquid from tank as shown in figure B. Assuming that the liquid level transmitter always is direct acting, for each configuration, what control action should a proportional controller have if the control valve is 1. Air-to-open and 2. Air-to-Close? **[6]**

(a) (b)
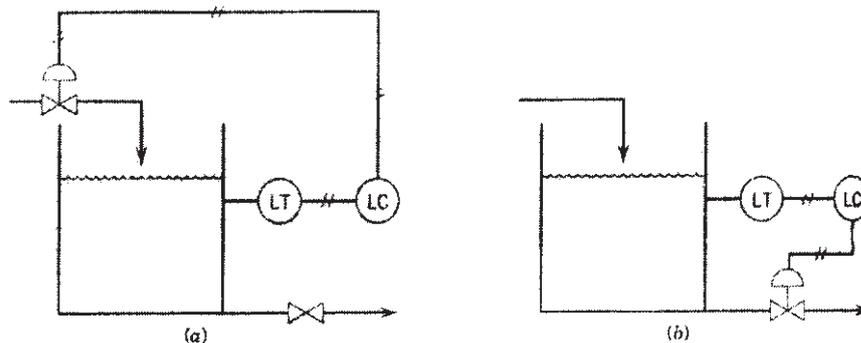
b) Discuss in brief the integral control action and reset windup. **[6]**

c) Discuss the performance criteria for closed loop systems. **[6]**

OR

Q6) a) Explain the Ziegler-Nichol (Z-N) method of controller tuning. State the disadvantages and precautions to implement this (Z-N) method of tuning. **[9]**

b) Explain the actual working of a simple feedback loop with pneumatic valve as its final control element. Define with the help of suitable example. **[9]**

SECTION - II

Q7) a) Define stability of a control system. Discuss the Routh-Hurwitz stability criterion along with its limitations. **[8]**

b) The open loop transfer function of a control system is given as $G(s) = Kc* (10s + 1)^{-1}$. Draw Bode diagram for the control system. **[8]**

OR

Q8) a) Explain the method of plotting the root locus diagram for negative feedback system. **[8]**

b) What is Bode stability criterion? With respect to Bode diagram, define with significance Amplitude Ratio, Phase angle, Gain margin and Phase margin. **[8]**

Q9) a) With the help of suitable block diagram, explain the inferential control strategy. **[8]**

b) With help of a block diagram give the overview of the Model Predictive Control. **[8]**

OR

Q10) Discuss Process Safety and Process control with respect to : **[16]**

a) Role of Basic Process control system.

b) Process Alarms.

c) Safety interlock systems.

d) Interlock and Automatic Shutdown systems.

Q11) a) What do you mean by Cascade control? Explain the Cascade control scheme for temperature and concentration at top of distillation column. **[9]**

b) Write a short note on Time Delay compensation using smith predictor technique. **[9]**

OR

Q12) Write short notes with respect to digital process control systems on (any three) : **[18]**

a) Distributed Digital Control Systems.

b) Analog and Digital Signals and Data Transfer.

c) Programmable logic Controllers.

d) Software organization of a Digital Process control systems.

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P588

[4064] - 567

B.E. (Petrochemical)

OPTIMIZATION TECHNIQUES FOR PROCESS INDUSTRIES

(Elective - I) (2008 Course) (412404D) (Sem. - I)

Time : 3 Hours]   *[Max. Marks : 100*

Instructions to the candidates:

1)   Answer 3 questions from each section.

2)   Answers to the two sections should be written in separate books.

3)   Neat diagrams must be drawn wherever necessary.

4)   Figures to the right indicate full marks.

5)   Use of logarithmic tables, slide rule, Mollier charts, electronic pocket calculator and steam table is allowed.

6)   Assume suitable data, if necessary.

SECTION - I

Q1) a)   Write down need of optimization techniques for petrochemical plants.   **[8]**

  b)   Define and discuss :   **[8]**

   i)   Design Variables.   ii)   Constraints.

   iii) Objective Functions.   iv)   Stationary Points.

OR

Q2) a)   State the necessary and sufficient conditions for the minimum of a function $g(x)$.   **[8]**

  b)   State whether the following functions are convex, concave or neither**[8]**

   i) $f_1 = -2x^2 + 8x + 4$ ii) $f_2 = e^{-x}$ where $x > 0$

   iii) $f_3 = x_1 x_2$

Q3) a)   Use three iteration of golden section search to maximize the function $f(x) = 10 + x^3 - 2x - 5 \exp(x)$.   **[10]**

  b)   Write a stepwise procedure for minimization of a function using Region Elimination Method.   **[6]**

Q4) a) Use two iterations of bisection method to minimize the function **[8]**
$$f(x) = \exp(x) - x^3$$
in the interval (2, 5).

b) Compare Newton's method and Secant's method for single variable optimization and provide the stepwise procedures as well. **[8]**

Q5) a) Write a note on optimality criteria for multivariable optimization; in this context discuss Hessian matrix and its evaluation also. **[8]**

b) Provide stepwise procedure of Marquardt's method for multivariable optimization. **[6]**

c) What are the differences between Cauchy's and Newton's search methods? **[4]**

Q6) a) Solve the following equations by formulation suitable optimization problem : **[10]**
$$2x + y = 5$$
$$3x - 2y = 2$$

b) Solve the following linear programming problem : **[8]**
$$10x + 5y \leq 2500$$
$$4x + 10y \leq 2000$$
$$x + 1.5y \leq 450$$
and $x, y \geq 0$

SECTION - II

Q7) a) Explain Kuhn- Tucker conditions and discuss its usefulness in practical day-to-day optimization techniques. **[8]**

b) Identify whether the points **[10]**
i) $(0, 6)^T$ ii) $(1.5, 1.5)^T$ iii) $(2, 2)^T$
are optimal for the NLP problem :
$$\text{Min. } x_1^2 + x_2^2 - 10x_1 + 4x_2 + 2$$
Sub. to, $x_1^2 + x_2 - 6 \leq 0,$
$$x_2 \geq x_1$$
$$x_1 \geq 0$$

Q8) a) Solve using Simplex method :   [10]
           Minimize $F = x_1 + 2x_2 + x_3$
           Sub. to, $2x_1 + x_2 - x_3 \leq 2$
                      $-2x_1 + x_2 - 5x_3 \geq -6$
                      $4x_1 + x_2 + x_3 \leq 6$
                      $x_1, x_2, x_3 \geq 0$

     b) Write short notes on :   [8]
         i)   Lagrange's Multiplier.
         ii) Sensitivity Analysis.

Q9) a) Consider the constrained integer nonlinear programming :   [10]
           Minimize $f(x) = (x_1^2 + x_2 - 9)^2 + (x_1 + x_2^2 - 7)^2$
           Sub. to, $g_1(x) = 26 - (x_1 - 5)^2 - x_2^2 \geq 0$
                      $g_2(x) = 20 - 4x_1 - x_2 \geq 0$
                      x_1 and $x_2 \geq 0$ and x_1 and x_2 are integers.

     b) What is dynamic programming? Discuss its necessity and usefulness.
         With help of suitable example provide stepwise procedure.   [6]

                                    OR

Q10) a) What is Geometric Programming? How is it implemented?   [6]
      b) Perform two iterations of the branch-and-bound method to minimize
          the following integer nonlinear programming problem :   [10]
               Minimize $0.1 (x_1^4 + x_2^4) - x_1^2 x_2$
               Sub. to $x_1^2 + 2x_2^2 \leq 100$ and x_1 and x_2 are integers.

Q11) a) With help of neat sketch discuss multimodal optimization.   [4]
      b) What is Pareto optimization - explain with help of suitable real world
          problem.   [6]
      c) Write a stepwise procedure of Simulated Annealing.   [6]

                                    OR

Q12) a) What are the advantages of GA over conventional techniques?   [4]
      b) Discuss the working principle of binary coded genetic algorithm.   [8]
      c) Write a short note on particle swarm optimization.   [4]

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P590

[4064] - 577

B.E. (Polymer)

POLYMER PROCESSING OPERATIONS - II

(2008 Course) (409363) (Sem. - I)

Time : 3 Hours]   *[Max. Marks : 100*

Instructions to the candidates:

1)   *Answer 3 questions from Section - I and 3 questions from Section - II.*

2)   *Answers to the two sections should be written in separate books.*

3)   *Neat diagrams must be drawn wherever necessary.*

4)   *Figures to the right indicate full marks.*

5)   *Use of logarithmic tables slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.*

6)   *Assume suitable data, if necessary.*

SECTION - I

Q1) a)   Discuss parison programming benefits in continuous extrusion blow molding.   **[3]**

b)   Draw a neat sketch of convergent and divergent cup and pin arrangement or die and mandrel arrangements and discuss the relative merits of each.   **[5]**

c)   What is the function of manifold block in multiparison extrusion blow molding machine.   **[3]**

d)   Draw any one type of parison die head assembly and explain the functioning of major parts.   **[5]**

OR

Q2) a)   Explain how transparency and yet high degree of crystallinity is achieved in single stage as well as two stage injection stretch blow molding of PET.   **[8]**

b) If a 100 liter ultra high molecular weight HDPE container with 10mm thickness is to be extrusion blow moulded give with justification the type of extrusion blow moulding machine and screw/barrel design that is recommended. Discuss the machine and process details. **[8]**

Q3) a) What is "heat reversion" in case of thermoforming? **[3]**

b) State any 2 faults that occur in thermoforming giving reasons & remedies for the same. **[4]**

c) Discuss different types of heating modes of thin and thick sheets in thermoforming. **[4]**

d) Explain with a neat sketch plug-assisted vacuum forming & drape forming. **[5]**

OR

Q4) a) A square box 100mm long 100mm wide and 50mm deep is thermoformed from a flat sheet 100mm ×100mm × 3mm. Estimate the average thickness of the walls of the final product if conventional vacuum forming is used. **[4]**

b) Write a short note on materials used in thermoforming. **[4]**

c) Discuss process control in case of thermoforming. **[4]**

d) Explain the process of air-slip forming and pressure forming with neat sketches. **[4]**

Q5) a) Draw a pressure profile through a calendar and derive an expression for maximum pressure (P_{max}). **[6]**

b) With the help of a neat sketch explain a calendaring line for PVC. **[6]**

c) Why does roll deflection occur in case of calendaring? Explain roll bending and cross-axis roll adjustment to overcome this problem. **[6]**

OR

Q6) Write short notes the following with respect to calendaring :

a) Hydraulic pull backs & Bearings in calendaring. **[6]**

b) Parameters which control the sheet path through the calendar. **[6]**

c) Explain any 3 faults with reasons and remedies. **[6]**

SECTION - II

Q7) a) Discuss rotational moulding of nylons with respect to type of nylons, special features of nylon rotational molding as against polyolefins, process control and mould systems. **[8]**

b) Discuss the effect of any two of the following on rotational moulding process control : **[4]**
   i) Mould release agent.
   ii) Mould material.
   iii) Particle size and particle size distribution.

c) Discuss the effect of initial viscosity and rate of rise of viscosity during the rotational moulding of liquid polymers. **[4]**

OR

Q8) a) Discuss any one type of rotational moulding machine and explain its advantages. **[5]**

b) How principle of heat exclusion and heat inclusion is used for thickness control in rotational molding? **[5]**

c) Explain how one can find out when the rotational moulding article is released from the mould wall or explain how to determine cooling time from the robolog of internal air temperature. **[6]**

Q9) a) Discuss in short full shot water injection moulding process. **[6]**

b) Explain the gas penetration behaviour in case of gas injection moulding. **[6]**

c) Explain the basic principles of injection compression moulding and mention the processes where it finds applications. **[6]**

OR

Q10) a) Explain any one type of injection foam moulding process. **[4]**

b) Explain the basic principle of low pressure injection moulding and different methods of ensuring low pressure during moulding. **[4]**

c) With reference to suitable example of fast crystallising polymer, explain structure development during injection moulding. **[5]**

d) Discuss microinjection moulding processes with respect to process details, applications and moulds. **[5]**

*Q11)*a) Explain how machining characteristics of plastics differ from that of metallic materials. Explain laser machining of plastics. **[6]**

b) Discuss the different methods of surface treatment for plastics before decorating or printing on it. **[6]**

c) Discuss the following with respect to vacuum metallizing. **[4]**
   i)   First surface metallising and
   ii) Second surface metallizing

<div align="center">OR</div>

*Q12)*a) What are the reasons for recycling plastics? Discuss the different ways of collection of plastic wastes. **[6]**

b) With the help of a neat sketch describe the Crammer feeder used in recycling of plastics. **[4]**

c) List the plastic that can be electroplated. Explain the typical process sequence for electroplating of ABS. **[6]**

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P591

[4064] - 578

B.E. (Polymer Engineering)
FIBER TECHNOLOGY
(2008 Course) (Elective - I) (409364 (A)) (Sem. - I)

Time : 3 Hours] [*Max. Marks : 100*

Instructions to the candidates:

1) *Answers 3 questions from Section - I and 3 questions from Section - II.*

2) *Answers to the two sections should be written in separate books.*

3) *Neat diagrams must be drawn wherever necessary.*

4) *Figures to the right indicate full marks.*

5) *Assume suitable data, if necessary.*

SECTION - I

Q1) a) What are various sources for Natural fiber? Give suitable examples of each source. **[4]**

b) Why is it necessary to control DEG formation during PET manufacture? **[6]**

c) Explain in detail the side reactions during PET synthesis. **[6]**

OR

Q2) a) What are various routes to synthesize PET for fiber manufacture? Explain any one in detail. **[8]**

b) Enlist the various factors those contribute to DEG formation in PET synthesis. **[4]**

c) Explain the effect of Gel Formation on fiber spinning. **[4]**

Q3) a) What are the sources of flow instabilities that arise during fiber spinning? **[2]**

b) What is "draw resonance" w.r.t. fiber spinning? Explain its role in fiber spinning. **[6]**

P.T.O.

c) What are the various types of cooling systems used in melt spinning technique? With neat sketch explain any one in detail. **[6]**

d) Why pre-drying step is necessary in case of PET fiber spinning while not for PP fiber spinning. **[4]**

OR

Q4) a) Write a short note on "Effect of Dieswell and melt fracture" on fiber spinning operation. **[8]**

b) What do you understand by primary, secondary and resulting variable of melt spinning technique? Enlist the primary variables of melt spinning operation. **[6]**

c) Can cellulose fiber be obtained by melt spinning. Explain in detail the spinning technique used for manufacturing cellulose fibers. **[4]**

Q5) a) Write a short note on "spin finishes for staple Fiber Production and Processing". **[8]**

b) Explain the following terms : Crimping, draw texturing, mercerisation, nanofibers. **[8]**

OR

Q6) a) What are the primary functions of spin finish? Enlist the properties those should be present in spin finish in order to accomplish the primary functions. **[8]**

b) Explain "Metered finish systems" used for application of fiber finish. **[4]**

c) Explain why fibers need to be twisted & what method is used for it. **[4]**

SECTION - II

Q7) a) Explain following terms : fiber, staple fiber, yarn, denier, tex, dtex, tenacity, heat setting, filament denier, barring effect. **[10]**

b) Explain steps to obtain a staple yarn from natural fibers. **[4]**

c) Give 4 commercial names of fibers & the source from which they are obtained. **[4]**

Q8) a) Taking eg. of any synthetic fiber give the steps required to obtain staple fiber production. **[10]**

b) Give the structural changes that take place during spinning and drawing steps and how do they influence the properties obtained by that fiber.**[5]**

c) What is the significance of Tg in case of fiber manufacturing process.**[3]**

Q9) a) What is the difference between mass coloration and dyeing? What are the advantages offered by each. **[5]**

b) Explain the various methods used for mass coloration taking eg. of any synthetic fiber. **[8]**

c) What is the role played by levelling agent. **[3]**

OR

*Q10)*a) Explain following dyeing techniques : **[10]**

i) Disperse dyeing. ii) Carrier dyeing.

iii) High temp. dyeing and iv) Thermosol dyeing.

Give the advantages & disadvantages of each process.

b) What is meant by acid dye and basic dye. In case of nylon which type of dye is used & why. **[6]**

*Q11)*a) Why synthetic fibers need to be modified and explain what methods are used to modify polyester fibers. **[10]**

b) Write a short note on bi-component fibers and creeze free fabric. **[6]**

OR

*Q12)*a) Why testing is required for synthetic fibers. Give the methods used for doing the testing of filament yarns. **[10]**

b) Write a short note on differential dyeable nylons. **[3]**

c) Write a short note on modified nylons. **[3]**

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P592

[4064]-580

B.E. (Polymer Engineering)
POLYMER REACTION ENGINEERING
(Elective - I) (409364(C)) (2008 Course) (Sem. - I)

Time : 3 Hours] [*Max. Marks : 100*

Instructions to the candidates:
   1) *Answers to the two sections should be written in separate books.*
   2) *Draw neat diagrams wherever necessary.*
   3) *Figures to the right indicate full marks.*
   4) *Assume suitable data, if necessary.*
   5) *Use of logarithmic table, electronic pocket calculators is allowed.*

SECTION - I

Q1) a) Discuss in brief polymerization processes by using reactant preparation, polymerization and separation. **[8]**

   b) Discuss in detail any four quantities commonly used for the characterization of Polymers. **[8]**

OR

Q2) a) Explain the different parameters used for designing of polymerization reactor. **[8]**

   b) Find the Number average, weight average Molecular weight and polydispersity Index of the given mixture which is composed of 1 molecule of 10,000 monomer lengths and 19 molecules of 20,000 monomer lengths and 25 molecules of 2000 monomer lengths. **[8]**

Q3) a) Derive the necessary equation for the total concentration of the free radicals under free radical polymerization. **[6]**

   b) Discuss the mechanism of Ionic polymerization and derive the necessary expression for Instantaneous Fractional Degree of Polymerization and Instantaneous weight Degree of Polymerization by using Ionic Polymerization. **[12]**

P.T.O.

Q4) a) Monomer styrene is polymerized in batch reactor at 60°C with the free radical initiator. The initial concentration of styrene is 8 gmole/lit, and the concentration of initiator is kept constant at 0.02 gmole/lit. Assume termination takes place only by combination. The rate constant are as $K_o = 3*10^{-6}$ sec^{-1}, k_p = 176 lit/gmole.sec, $k_c = 3.6*10^7$ lit/gmole.sec, f = 0.6 the volume of the reactor filled by the reacting system is 3700 lit. For a reaction time of 10,800 sec, compute the following : The percentage of the styrene polymerized, The number average molecular weight. **[12]**

b) Discuss the distinction between chain polymerization Vs step Polymerization based on kinetics. **[6]**

Q5) a) Explain different advantages and disadvantages of Bulk, solution and emulsion and suspension polymerization techniques. **[12]**

b) Write a note on Aqueous Emulsifier Solutions. **[4]**

OR

Q6) Discuss in detail Smith and Ewart theory for Stage II of Emulsion polymerization. **[16]**

SECTION - II

Q7) a) Discuss with neat diagram the German Tower process for polymerization of styrene. **[9]**

b) Discuss the process flow sheet for the manufacture of PVC by suspension polymerization. **[9]**

OR

Q8) Describe with neat process sheet the reactor systems used for HDPE, Nylon 6 polymers. **[18]**

Q9) a) Explain with the importance of the term Ceiling temperature of free radical polymerization under equilibrium condition. **[8]**

   b) Write a note on Control of molecular weight in free radical polymerization at high degree of conversion. **[8]**

OR

Q10) Discuss the model to account for effect of diffusion on rate constant in step growth polymerization at high degree of conversion. **[16]**

Q11) a) Write a note on Extruder Reactors. **[8]**

   b) Explain Safety of polymerization Reactors with suitable examples. **[8]**

OR

Q12) a) Discuss the control of emulsion polymerization reactor. **[8]**

   b) Explain the role of process instrumentation in control of polymerization reactors. **[8]**

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P599

[4064] - 589

B.E. (Computer Engineering)
DESIGN & ANALYSIS OF COMPUTER NETWORKS
(2008 Course) (410444B) (Elective - I) (Sem. - I)

Time : 3 Hours]   *[Max. Marks : 100*

Instructions to the candidates:

1) *Answers 3 questions from Section - I and 3 questions from Section - II.*
2) *Answers to the two sections should be written in separate books.*
3) *Neat diagrams must be drawn wherever necessary.*
4) *Figures to the right indicate full marks.*
5) *Use of logarithmic tables slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.*
6) *Assume suitable data, if necessary.*

SECTION - I

Q1) a)   There are three classes of messages in a system :   **[10]**
Batch (low priority) : 1000 characters; 10 msg/sec
Interactive (medium priority) : 100 characters; 100 msg/sec.
Control (high priority): 20 characters: 10 msg/sec

   i)   What is the average time in the system for each type of message? What is the average time in the system overall?

   ii) What is the average time in the system if no priorities are used? Why this is different than in part i)?

   b)   What is Jackson's theorem. How it is applied to the network of queues.   **[8]**

OR

Q2) a)   A communication line capable of transmitting at a rate of 50 kbits/sec will be used to accommodate 10 sessions each generating poisson traffic at a rate 150 packets/min. Packet lengths are exponentially distributed with mean 1000 bits. For each session, find the average number of packets in queue, the average number in the system, and the average delay per packet when the line is allocated to the sessions by using :

   i)   10 equal-capacity time-division multiplexed channels.

   ii) Five of the session transmit at a rate of 250 packets/min while the other five transmit at a rate of 50 packets/min.   **[10]**

   b)   Explain little's theorem and its applications in computer networks.**[8]**

P.T.O.

Q3) a) Explain in brief various optimization techniques like multiplexing parallelism, virtulization, soft state etc used in system design. **[10]**

b) What is the largest purely output queued ATM switch, we can build if we use 80 ns. 4 byte wide DRAM with a zero cell loss requirement? Assume input lines are 155 Mbps. How large can the switch be with cell - wide access? If we decide to run the output at only 0.4 N times the input lines (insted of N times faster than the input lines), how big a switch can we build? **[6]**

OR

Q4) a) Explain the steps for performance analysis and tunning. How performance of a system is tunned? **[6]**

b) Explain banyan switching fabric. How does a tandem banyan work? What is a batcher banyan fabric? Give brief description. **[10]**

Q5) a) Explain TCP Tahoe & TCP vegas in details. **[8]**

b) Explain in brief the requirements that a scheduling discipline must satisfy. **[8]**

OR

Q6) a) Explain the WFQ discipline for scheduling the best effort applications. **[8]**

b) Explain open loop flow control mechanism. Explain and compare the common descriptors used for open loop flow control schemes. **[8]**

SECTION - II

Q7) a) What is admission control? Explain in brief admission control policies in CBR, VBR and best effort applications. **[10]**

b) State and explain different traffic models. **[8]**

OR

Q8) a) What is signaling mechanism? Explain IETF signaling (RSVP). **[10]**

b) What are the different time scales and mechanisms used at these time scales for traffic management. Explain in brief. **[8]**

Q9) a) Explain random early detection (RED) scheme for packet scheduling. **[8]**

b) What are the implementation principles of router architecture and algorithms? **[8]**

OR

*Q10)*a) Explain the methods for traffic matrix computation. **[6]**

b) Explain Lulea compressed tries scheme in detail. **[10]**

*Q11)*a) Discuss the security issues at network layer with suitable examples and possible solutions. **[8]**

b) What is subnetting? Explain in detail. When host on following two 1p addresses will be on the same network? **[8]**
   i)   192.168.6.30.
   ii) 192.168.7.29

OR

*Q12)*a) What are the roles and responsibilities of the network administrator? Explain in detail. **[10]**

b) How bandwidth management is done? How does bandwidth management tools help? **[6]**

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P600

[4064]-590

B.E. (Computer Engineering)
ARTIFICIAL INTELLIGENCE
(410444(C)) (2008 Course) (Elective - I) (Sem. - I)

Time : 3 Hours]   *[Max. Marks : 100*

Instructions to the candidates:

1)   Attempt three questions from Section - I and three questions from Section - II.

2)   Answers to the two sections should be written in separate books.

3)   Neat diagrams must be drawn wherever necessary.

4)   Assume suitable data, if necessary.

SECTION - I

Q1) a)   What is Logic programming? Explain backward and forward reasoning with an example.   **[8]**

b)   Define Artificial Intelligence. List the applications of Artificial Intelligence.   **[8]**

OR

Q2) a)   Explain in detail the architecture of a typical agent. List the applications of agents.   **[8]**

b)   There are two jugs, a 4 gallon and other a 3 gallon with no measuring marker on them. There is endless supply of water through the tap. Goal is to get 2 gallons of water in the 4 gallon jug. For the following problem have a state space representation and solve the water jug problem. Specify the rules.   **[8]**

Q3) a)   Explain Means End Analysis with an example.   **[8]**

b)   Explain the AO* algorithm to solve a problem.   **[10]**

OR

Q4) a) Explain in detail the techniques used to improve the efficiency of MiniMax algorithm. **[10]**

b) Explain the A* algorithm to solve a problem. **[8]**

Q5) a) Write a script of visit to a Dentist or Doctor. **[8]**

b) State the rules for converting a given well formed formula to clause form. **[8]**

OR

Q6) a) Explain in brief with example, frame and semantic network. **[8]**

b) Show how a JTMS could be used in medical diagnosis. Consider rules such as, "If you have a runny nose, assume you have a cold unless it is allergy season". **[8]**

SECTION - II

Q7) a) Describe any of the two learning methods. **[8]**

b) For Block World problem Goal Stack planning problem and solve it. **[10]**

OR

Q8) a) Explain Waltz's algorithm with an example. **[8]**

b) Comment on Non-Linear Planning and hierarchical Planning. **[10]**

Q9) a) Explain in brief the various phases in natural language processing. **[8]**

b) Draw a parse tree and parse the sentence correctly for : **[8]**

i) John wanted to go to the movie with Sally.

ii) The girl eats an apple.

OR

Q10) a) Explain the Robot architecture. **[8]**

b) Explain an ATN with an example. **[8]**

*Q11)*a)   Give detailed architecture of Expert System and explain its components.

[8]

b)   Explain in detail the architecture of artificial neural network and comment on its topology. **[8]**

OR

*Q12)*a)   Applications of neural network. **[8]**

b)   What is the difference between expert system and traditional system? Comment on the advantages and disadvantages of expert system. **[8]**

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P601

[4064] - 591
B.E. (Computer Engineering)
SOFTWARE ARCHITECTURE
(2008 Course) (Sem. - I) (Elective - I) (410444(D))

Time : 3 Hours]   *[Max. Marks : 100*

Instructions to the candidates:

1)   *Answers 3 questions from Section - I and 3 questions from Section - II.*

2)   *Answers to the two sections should be written in separate books.*

3)   *Neat diagram must be drawn wherever necessary.*

4)   *Figures to the right indicate full marks.*

5)   *Assume suitable data, if necessary.*

SECTION - I

Q1) a)   What do you mean by software Architecture? Explain the importance of software Architecture in software development.   **[6]**

 b)   How Architectures are influenced by system stakeholders?   **[6]**

 c)   What do you understand by components and connectors?   **[4]**

OR

Q2) a)   Explain the Architecture Business cycle.   **[8]**

 b)   How the collaboration can be used to model the system of components and connectors?   **[8]**

Q3) a)   What is availability? Discuss availability tactics for fault detection. **[8]**

 b)   Explain the template for documenting interfaces.   **[8]**

OR

Q4) a)   Give scenario for performance and usability quality attributes. **[8]**

 b)   Explain quality attributes of web application.   **[8]**

P.T.O.

Q5) a) Describe Abstract factory pattern with respect to intent, application and solution. **[8]**

b) Explain when proxy pattern can be applied. Give the solution of proxy pattern using UML diagram. **[6]**

c) How do you ensure about the single instance of a Maze game application. **[4]**

OR

Q6) a) How observer pattern can be used to design a digital and an analog clock. Explain with the structure and behaviour. **[8]**

b) Give the structure of object and class adapter pattern. **[6]**

c) Explain the template for design pattern documentation. **[4]**

SECTION - II

Q7) a) What is middleware? Explain in brief different types of middlewares. **[6]**

b) Explain with neat diagram J2EE Architecture. Discuss how it supports MVC Architecture. **[8]**

c) Differentiate between web-server and application server. **[4]**

OR

Q8) a) Explain with diagram EJB Architecture. **[6]**

b) What is JDBC? Write different steps to connect to database and execute query using JDBC with an example. **[8]**

c) What is XML? Explain use of DTD in XML with an example. **[4]**

Q9) a) Write a note on Activex control. **[4]**

b) Explain the n-tier web architecture. **[6]**

c) What is Java Applet. Give Applet life-cycle with an example. **[6]**

OR

*Q10)*a) Compare XML and HTML.   **[4]**

   b) What is 3 tier architecture? What are the J2EE technologies supporting client tier.   **[6]**

   c) Explain with diagram AJAX web application model.   **[6]**

*Q11)*a) What is SOA? Explain SOA environment.   **[8]**

   b) Write short notes on :   **[8]**
       i)   JSP Architecture.
       ii) Servlet life cycle.

                            OR

*Q12)*a) Explain Java web services. What is the relationship between SOA & Web services?   **[8]**

   b) Explain with diagram struts architecture.   **[8]**

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P611
[4064]-6
B.E. (Civil)
SYSTEMS APPROACH IN CIVIL ENGINEERING
(Common to 1997 Course & 2003 Course) (Elective - I) (401005) (Sem. - I)

Time : 3 Hours]   *[Max. Marks : 100*

Instructions to the candidates:

    1)   *Answer 3 questions from Section - I and 3 questions from Section - II.*

    2)   *Answers to the two sections should be written in separate books.*

    3)   *Neat diagrams must be drawn wherever necessary.*

    4)   *Figures to the right indicate full marks.*

    5)   *Use of logarithmic tables, slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.*

    6)   *Assume suitable data, if necessary.*

SECTION - I

Q1) a)   Minimize $Z = x_1 + x_2 + x_3$ **[12]**

            Subject to

$$x_1 + 3x_2 \leq 10$$
$$x_1 + x_2 + x_3 \geq 6$$
$$x_1 \geq 2$$
$$x_1, x_2, x_3 \geq 0$$

            Solve using Big M Method.

     b)   Explain unbounded solution in L.P.   **[4]**

<div align="center">OR</div>

Q2) a)   Solve the problem in Q1 (a) above by Two phase Method.   **[12]**

     b)   Explain Infeasible Solution in L.P.   **[4]**

Q3) a)   The following table gives the unit cost of transporting construction material from 3 plants to 3 sites, as well as the requirement at each site and the availability at each point.   **[14]**

Plants	Sites			Supply
	A	B	C	
1	4	8	8	76
2	16	24	16	82
3	8	16	24	77
Demand	72	102	41	

Determine the minimum cost of transportation use VAM to find the initial feasible solution.

b) Explain degeneracy in a transportation model. **[4]**

OR

Q4) a) Four earth moving machines are to be used on four construction sites. The cost of assignment of each machine on each site is given below. The cell marked with a dash indicates that the corresponding assignment is not possible. Determine the assignment which will minimize the total cost of assignment. **[10]**

Machine	Construction Site			
	A	B	C	D
1	5	5	–	2
2	7	4	2	3
3	9	3	5	–
4	7	2	6	7

b) How will you solve an assignment problem if it is unbalanced and for maximization? **[4]**

c) What are the disadvantages of N-W Corner Method in a transportation model. **[4]**

Q5) a) Use Fibonacci Method to minimize $Z = x^2 + \frac{100}{x}$ within 1% accuracy in the 2 to 10 carry out first 4 iterations only. **[8]**

b) Use steepest gradient method to maximize $Z = 6x_1 + 8x_2 - x_1^2 - x_2^2 - 35$ Take Starting Point as (0, 0). **[8]**

OR

Q6) a) Compare the various one-dimensional search techniques in NLP. **[6]**

b) Compare Newton's Method with the Steepest Gradient Method. **[6]**

c) Explain local maxima and global maxima. **[4]**

SECTION - II

Q7) a) Use Lagrange Multiplier Technique to minimize **[10]**

$Z = 3x_1^2 + 4x_2^2 - 5x_1x_2 - 8x_2$

Subject to

$x_1 + x_2 = 4$.

b) State Bellman's Principle of optimality. What is a recursive equation? **[4]**

c) What are the applications of D.P in Civil Engineering? **[4]**

OR

Q8) A promoter builder intends to invest 6 money units in three projects. The returns, depending upon the level of investment are given in the following table.

Investment	Returns from Projects		
	A	B	C
0	0	0	0
1	25	20	33
2	42	38	43
3	55	54	47
4	63	65	50
5	69	73	52
6	74	80	53

a) Using dynamic programming, find the optimal allocation to maximize total returns. **[14]**

b) In case only 4 money units are available, what will be the allocation and the total returns. **[4]**

Q9) a) Five jobs are to be processed in three departments A, B and C in the sequence A – B – C. The time required for each job in each department is given below. Determine the sequence in which the jobs are to be processed if the total elapsed time is to be minimized. **[10]**

Job	Time in hours		
	A	B	C
1	13	9	14
2	12	8	9
3	11	7	12
4	15	10	13
5	16	11	15

Tabulate the processing sequence and determine the total elapsed.

b) What are the various components of a queueing model? Discuss their characteristics. Explain Kendal's notation. **[6]**

OR

Q10) a) Vehicles arrive at a toll booth following a Poisson distribution with a mean inter-arrival time of 6 minutes. The time it takes to collect toll and clear the vehicle is exponentially distributed with an average service time of 4 minutes. **[8]**

i) What is the chance that a vehicle will be cleared immediately.

ii) What is the probability that the service facility is busy?

iii) What is the average length of the queue and the average number of Vehicles in the System?

iv) What is the average waiting time of the vehicles in the queue and the average time a vehicle spends in the system?

b) What are the different types of waiting line layouts? Explain with examples. **[4]**

c) State the applications of simulation technique to the field of civil engineering. **[4]**

Q11) Explain the following: [16]

    a) Internal rate of return and marginal rate of return.
    b) Discount rate and interest rate.
    c) Net present value and B/C ratio.
    d) Mutually exclusive projects and mutually compatible projects.

<div align="center">OR</div>

Q12) a) Explain the assumptions made in a two - person zero-sum Game. [4]
      b) Explain the theory of Dominance in solving a game. [6]
      c) What are direct costs and indirect costs in a construction project? [6]

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P617

[4064]-133

B.E. (E & T.C)

ADVANCED COMMUNICATION SYSTEMS
(2003 Course) (404225) (Elective - II) (Sem. - II)

Time : 3 Hours] *[Max. Marks : 100*

Instructions to the candidates:

1) Answer any three questions from each section.

2) Answers to the two sections should be written in separate books.

3) Neat diagrams must be drawn wherever necessary.

4) Figures to the right indicate full marks.

5) Assume suitable data, if necessary.

SECTION - I

Q1) a) Explain the operational principles of WDM and the implementation of WDM network containing various types of optical amplifiers. **[10]**

b) With a neat cross-sectional view explain the 2×2 fiber coupler. **[8]**

OR

Q2) a) A 2×2 bicanical tapered fiber coupler has an input optical power level of $P_0 = 200\mu W$. The output powers at the other 3 ports are $P_1 = 90\mu W$, $P_2 = 85\mu W$ and $P_3 = 6.3nW$. Find the coupling ratio; Excess loss, Insertion loss (port 0 to port 1), Insertion loss (port 0 to port 2), and the cross talk. **[10]**

b) Draw the basic concept of a tunable optical filter and also discuss the relevant system parameters. **[8]**

Q3) a) Explain the transmission formats and speeds of SONET/SDH. **[8]**

b) Draw and explain the architecture of a single-hop broadcast and select network. **[8]**

OR

Q4) a) Explain the nonlinear effects on optical network performance. **[8]**

b) Explain the example of an optical CDMA network based on using a coded sequence of pulses. **[8]**

Q5) a) What are Kepler's three laws of planetary motion? Give the mathematical formulation of Kepler's third law of planetary motion. **[8]**

b) A satellite is in an elliptical orbit with a perigee of 1000km and an apogee of 4000km. Using a mean earth radius of 6378.14km, find the period of orbit in hours, minutes and seconds and the eccentricity of the orbit.**[8]**

OR

Q6) a) Draw and explain the typical tracking telemetry, command and monitoring system in satellite communication. **[8]**

b) Explain the different antennas used in satellite communication along with the typical satellite antenna pattern and coverage zone. **[8]**

SECTION - II

Q7) a) A standard NTSC signal has a baseband video bandwidth of 4.2mhz and is transmitted over the satellite link in an RF bandwidth of 30mhz using FM and standard pre-emphasis and de-emphasis. At the receiving earth station the C/N ratio in clear air conditions is 15dB. Calculate the baseband S/N ratio for the video signal. Assume a de-emphasis improvement of 9dB and a subjective improvement factor of 8dB in the baseband S/N. **[10]**

b) A satellite transponder has a bandwidth of 36mhz. Earth stations use Root Raised Cosine (RRC) filter with $\alpha = 0.4$. What is the maximum bit rate that can be sent through this transponder with

i) BPSK.

ii) QPSK. **[8]**

OR

Q8) a) Discuss the use of frequency modulation in analog satellite system.**[10]**

b) A Ku-band satellite uplink has a carrier frequency of 14.125mhz and carries a symbol stream at $R_S = 16$Msps. The transmitter and receiver have RRC filters with $\alpha = 0.25$. What is the bandwidth occupied by RF signal and what is the frequency range of the transmitted RF signal? **[8]**

Q9) a) A satellite at a distance of 40,000km from a point on the earth's surface radiates a power of 10 watt from an antenna with a gain of 17dB in the direction of the observer. Find the flux density at the receiving point, and the power received by an antenna at this point with an effective area of 10m^2. **[8]**

b) Draw and explain the double conversion earth station satellite receiver. **[8]**

Q10) a) Explain the satellite communication link design procedure. **[8]**

   b) Explain the Rain effects in Ku band. **[8]**

Q11) a) Explain the TDMA used in satellite communication with the TDMA frame structure. **[8]**

   b) Draw and explain the structure of the baseband content of a typical TDMA burst. **[8]**

Q12) a) Draw and explain the protocol architecture of a star VSAT network. **[8]**

   b) Explain the modulation, coding and interference issues in VSAT system. **[8]**

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P629

[4064]-416

B.E. (Mech. (S/W))

DYNAMICS OF MACHINERY

(2008 Course) (402042) (Sem. - I)

Time : 3 Hours]   *[Max. Marks : 100*

Instructions to the candidates:

1) *Answer three questions from section-I and three questions from section-II.*
2) *Answer to the two sections should be written in separate books.*
3) *Neat diagrams must be drawn wherever necessary.*
4) *Figures to the right indicate full marks.*
5) *Use of logarithmic tables slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.*
6) *Assume suitable data, if necessary.*

SECTION - I

Q1) a) A shaft rotating with three masses M_1, M_2 and M_3 as shown in fig.1. It is proposed to attach masses in plane M_2 and M_3 at a radius of 50 mm, SD as to completely balance the system. Find out the masses to be attached and their angular location with respect to the X axis as shown in fig. M_1 = 9kg, M_2 = 10.5kg, M_3 = 4kg, $\theta_1 = 90°$, $\theta_2 = 210°$, $\theta_3 = 255°$, $r_1 = 125$ mm, $r_2 = 75$ mm, $r_3 = 150$ mm. **[10]**
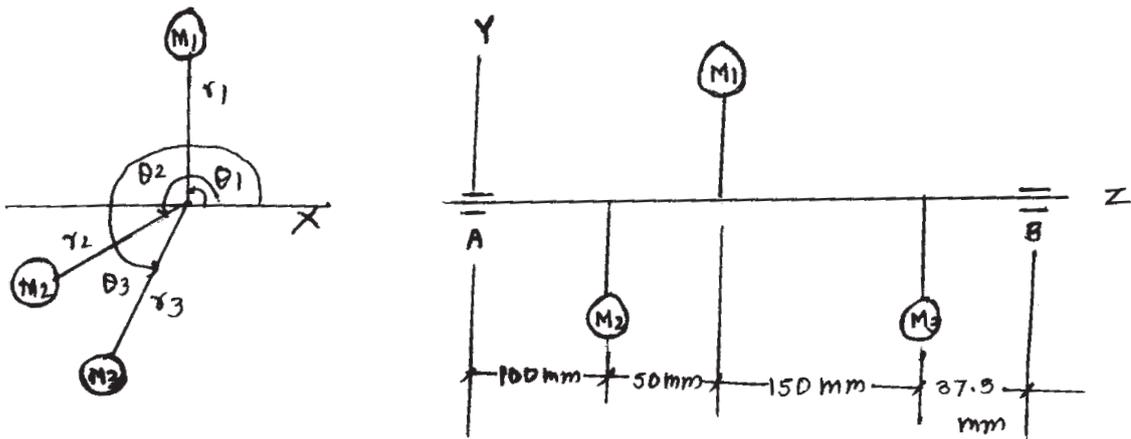

Fig 1.   Q NO. 1 (a)

b) Explain balancing of reciprocating masses. **[6]**

OR

Q2) a) In the statement "an eccentric mass rotating at 3000 rpm will create X times more unbalanced force than 50% of the same mass rotating at 300 rpm". What is the value of X? **[3]**

b) Explain the method of direct and reverse crank to find unbalance in radial engines. **[5]**

c) In a 60° V engine two connecting rods operate on a common crank pin. Stroke of each piston is 80 mm and the length of each connecting rod is 160 mm. If the engine speed is 3000 rpm and the mass of reciprocating parts per cylinder is 1.5kg. Find the values of maximum primary and secondary force unbalance, when the crank bisects the line of action of forces by 30°. **[8]**

Q3) a) A spring mass system has spring stiffness "μ" N/m and a mass of Mkg. It has natural frequency of vibration as 12Hz. An extra 2kg mass is coupled to M and the natural frequency reduces by 2Hz. Find K and M. **[6]**

b) The amplitude decreases to 0.33 of the inital value after four consecutive cycles. The damping factor will be? **[2]**

c) For the system shown in fig.2. Find the equation of motion and also determine its natural frequency. **[8]**
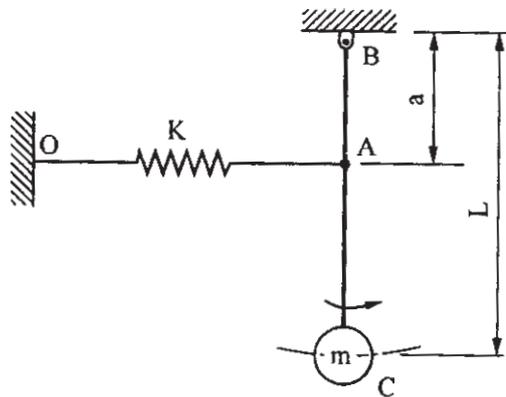

Fig. 2   Q. No. 3 (c)

OR

Q4) a) Derive a relation for determining the solution in case of free underdamped vibrations. Show amplitude versus time plot. **[6]**

b) A body of mass 5kg is supported on a spring of stiffness 1960 N/m and has dashpot connected to it which produces a resistance of 1.96 N at a velocity of 1m/sec. In what ratio will the amplitude of vibration be reduced after 5 cycles? **[6]**

c) A truck weighing 150 KN and traveling at 2m/sec impacts with a buffer spring which compresses 1.25cm per 10 KN. The maximum compression of the spring will be? **[4]**

Q5) a) Derive the expression for determining the amplitude of vibration for a system having a rotating or reciprocating unbalance. **[8]**

b) Two rear wheels of an automobile support a mass of 500kg through springs of 19600 N/m. What is the amplitude of vibration of rear of the automobile at a speed of 80km/hr on a road having waves 20mm total depth whose crests are 1.5m apart? At what speed will there be resonance? **[8]**

c) Define isolation factor or transmissibility ratio. Write down the equation for the same in relation with magnification factor. **[2]**

<div align="center">OR</div>

Q6) a) Derive an expression for determining the obsolute amplitude at vibration in case of the excitation of the base. **[8]**

b) A machine having a mass of 100kg is mounted on the springs and damper. The total stiffness of the springs is 7.84×10^5 N/m while the damping ratio of the damper is 0.2. A vertical harmonic force F = 392 sin (314.15t) N acts on the machine, for the steady state vibrations of the system determine :

   i) The amplitude of vibration of the machine.
   ii) The transmissibility.
   iii) The transmitted force.
   iv) The phase difference between motion and the exciting force. **[10]**

<div align="center">

SECTION - II

</div>

Q7) a) An automobile weighs 2000kg and has radius of gyration about its C G as 1.1 meter. The C G is located 1.4 meter behind the front wheel axis and the distance between rear wheel axis and CG is 1.6 meter. The front springs have a combined stiffness of 600 N/m and rear springs 650 N/m. Formulate the frequency equations and find out the pitch and bounce frequencies of an automobile. **[12]**

b) Explain Holzer method to determine the natural frequency and mode shapes of multirotor torsional vibration system. **[6]**

<div align="center">OR</div>

Q8) a) Determine the natural frequencies and the position of node of torsional vibration system having 2 rotors A & B attached to the ends of a shaft 1500 mm long. The mass moment of inertia of rotor A is 650kg.m^2 and that of rotor B is 215kg.m^2. The shaft is 95 mm diameter for the first 600 mm, 60 mm diameter for the next 500 mm length and 50 mm diameter for the remaining length. Modulus of rigidity of shaft material is 0.8×10^5 MPa. **[12]**

b) What do you mean by whirling of shaft? Derive the expression for deflection of vertical shaft with a single rotor without damping. **[6]**

Q9) a) Explain in brief the following terms : **[4]**

    i) Sound power level.
    ii) Sound pressure level.
    iii) Sound absorption coefficient.
    iv) Acoustic intensity.

b) Explain with neat diagram the working of human hearing mechanism.**[6]**

c) Add the noise of six machines, which individually make a noise level of 78, 81, 81, 79, 72 and 65 dB respectively. **[6]**

OR

Q10) a) What is the function of microphone? Explain the working of anyone type of microphone. **[4]**

b) Explain the working of sound level meter with neat diagram. **[6]**

c) Explain torsional vibration absorber with neat diagram. **[6]**

Q11) a) What is sound enclosure? Describe any one type of sound enclosure.**[4]**

b) What is FFT analyser? Explain how frequency spectrum can be used to detect vibration related faults in a system. **[6]**

c) A vibrometer has a period of free vibration of 2 sec. It is attached to a machine with a vertical harmonic frequency of 1Hz. If the vibrometer mass has an amplitude of 2.5mm relative to the vibrometer frame, what is the amplitude of vibration of machine. **[6]**

OR

Q12) Write short notes on <u>any three</u> : **[16]**

a) Vibration isolators.
b) Acceptable vibration standards.
c) Noise control at receiver.
d) Piezoelectric accelerometer.
e) Frequency measuring instrument.

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P630

[4064]-422

B.E. (Mechanical)
AUTOMOBILE ENGINEERING
(2008 Course) (402045 A) (Elective - II) (Sem. - I)

Time : 3 Hours]   *[Max. Marks : 100*

Instructions to the candidates:

1) *Answer three questions from section-I and three questions from section-II*
2) *Answers to the two sections should be written in separate answer books.*
3) *Neat diagrams must be drawn wherever necessary.*
4) *Figures to the right indicate full marks.*
5) *Use of logarithmic tables slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.*
6) *Assume suitable data, if necessary.*

SECTION - I

Unit - I

Q1) a) How do you classify automobiles? Explain them with the help of examples. Give specifications of any one petrol car of your choice. **[8]**

b) Explain front engine front wheel drive vehicle with help of neat sketch. Describe its advantages and disadvantages over other layouts. **[8]**

OR

Q2) a) State different types of chassis frame. Explain any one in detail. **[8]**

b) Sketch a neat layout of four wheel drive and explain its working. **[8]**

Unit - II

Q3) a) Draw a neat sketch of diaphragm spring clutch and describe it. **[8]**

b) Explain the working of a synchromesh gear box with help of a neat sketch. Discuss its merits and demerits over sliding mesh gear box.**[10]**

OR

Q4) a) Explain fluid flywheel with neat sketch. What are its advantages and disadvantages? **[10]**

b) Draw a neat sketch of a typical differential unit in the back axle of a vehicle and explain its working. **[8]**

Unit - III

Q5) a) Describe various types of stub axles with the help of suitable diagram, and state merits and demerits of each of them. **[8]**

b) Describe the working of power steering unit with neat sketch. **[8]**

OR

Q6) a) Define front end geometry for steering including caster, camber, toe, steering axis inclination and turning radius. **[8]**

b) Draw a neat sketch of tubeless tyres and explain its attributes over other tyres. **[8]**

SECTION - II

Unit - IV

Q7) a) What is an interconnected suspension system? Explain with neat sketch hydragas suspension. **[10]**

b) Discuss with neat sketch the working of hydraulic brakes. Also state its advantages and disadvantages. **[8]**

OR

Q8) a) Explain the independent front suspension arrangement with the help of neat sketch. **[10]**

b) Write short note on antiskid braking system (ABS). **[8]**

Unit - V

Q9) a) What are the different engine sensors are used on vehicle? Explain any one in detail. **[8]**

b) Write short note on electronic stability program. **[8]**

OR

Q10) Write short notes on <u>any four</u> : **[16]**

a) Electronic control unit.

b) Electric car layout.

c) Hybrid drive.

d) Electric horn.

e) Lead acid battery.

Unit - VI

Q11) a) What are various resistances to motion of vehicle? How do they affect power? Explain how power required by a vehicle is calculated while climbing a slope. **[8]**

b) What is active safety and passive safety? Explain any one safety device. **[8]**

OR

Q12) a) Write short note on "Sources of vibration of a vehicle". **[4]**

b) A truck weighting 6300kg has frontal area of 6.65 m². Effective wheel radius is 40.5 cm. Maximum wheel speed in top gear is 80 km/hr. The rolling resistance coefficient = 0.0175 and air resistance coefficient = 0.0285. The transmission efficiency in top and first gears are respectively 90% and 75%. Rear axle ratio is 6.15:1 First gear ratio is 5.65:1. Calculate :

i) The engine B.P. required to propel the vehicle on level road at 80 km/hr in top gear.

ii) The engine speed corresponding to 80 km/hr in top gear.

iii) The maximum gradient which the vehicle is capable of ascending in first gear corresponding to the above engine speed. **[12]**

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P631

[4064]-440

B.E. (Production)
POWDER METALLURGY
(2008 Course) (Elective - I) (Sem. - I) (411084 (C))

Time : 3 Hours]   *[Max. Marks : 100*

Instructions to the candidates:

1) *Answer Q. 1 or Q. 2, Q. 3 or Q. 4, Q. 5 or Q. 6 from section-I and Q. 7 or Q. 8, Q. 9 or Q. 10, Q. 11 or Q. 12 from section-II.*
2) *Answers to the two sections should be written in separate books.*
3) *Neat diagrams must be drawn wherever necessary.*
4) *Figures to the right indicate full marks.*

SECTION - I

Q1) a) Describe Rotating electrode atomization process with its advantages and areas of applications. **[6]**

b) With suitable examples, explain Carbonyl process of powder production. **[4]**

c) Explain the effects of particle size and shape on the following properties (any two) : **[4]**
   i) Apparent Density.
   ii) Flow rate.
   iii) Compressibility.
   iv) Green strength.

d) What is powder conditioning? **[4]**

OR

Q2) a) Explain the significance of Milling with reference to Powder Metallurgy. Also distinguish between Wet and Dry Milling. **[6]**

b) Explain the method by which copper powder of high purity can be obtained? State clearly the particle shape obtained in the same method.**[4]**

c) Write short note on Water Atomization. **[4]**

d) What are the advantages and limitations of Electrolytic Powder production method? **[4]**

Q3) a) Differentiate between Mechanical and Hydraulic presses. **[4]**

b) Why lubricants are required? Name two commonly used lubricants. **[4]**

c) Give the different types of materials used for dies and tooling purposes. List out advantages and limitations of graphite die over other materials.**[4]**

d) Write the advantages, disadvantages and applications of cold isostatic compaction. **[4]**

<div align="center">OR</div>

Q4) a) Explain the mechanism of compaction with the help of a model. **[4]**

b) Explain the factors affecting tooling design. **[4]**

c) Discuss the design problems of P/M parts due to powder flow and ejection. **[6]**

d) What are inserts? **[2]**

Q5) a) Give two examples of protective atmosphere. What is the necessity of protective atmosphere. **[6]**

b) With a neat sketch explain continuous mesh belt sintering furnace. State why Burn off zone is kept separate? **[6]**

c) Explain liquid phase sintering. **[4]**

<div align="center">OR</div>

Q6) a) What is the driving force for sintering? Explain the various stages of sintering. **[6]**

b) What is Activated Sintering? Explain with suitable example. **[6]**

c) Explain in brief infiltration with one practical application of it. **[4]**

<div align="center">

SECTION - II

</div>

Q7) a) Describe Hot isostatic compaction. What are its applications? **[6]**

b) Explain roll compaction and the effects of powder characteristics on powder rolling. **[6]**

c) Explain Injection moulding. **[4]**

<div align="center">OR</div>

Q8) a) Describe Powder forging with its advantages and limitations. **[4]**

b) Write short notes on (any three) : **[12]**

  i) Spray Deposition.
  ii) Problems of Hot Compaction.
  iii) Encapsulation.
  iv) Powder Extrusion.

Q9) a) What are the various heat treatments given to P/M parts? **[4]**

b) Explain in detail steam treatment. **[6]**

c) Write three important advantages and limitations of Powder Metallurgy. **[6]**

<div align="center">OR</div>

Q10) a) What do you understand by Nano particles? What are the problems in handling such powder? **[4]**

b) Distinguish between Coining and Sizing. **[4]**

c) Explain the various non-destructive tests carried on P/M products. **[4]**

d) What is impregnation? Where it is used? **[4]**

Q11) Explain the production details of the following with the help of a neat flow chart. Mention all the important parameters of the process. **[18]**

a) Self lubricated bearings and filters for filtering air.

b) Electrical contact materials.

c) Refractory materials.

<div align="center">OR</div>

Q12) Explain the production details of the following with the help of a neat flow chart. Mention all the important parameters of the process. **[18]**

a) Diamond impregnated tools.

b) Friction materials.

c) Cemented carbide tools.

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P633

[4064]-448

B.E. (Production S/W)

ADVANCED PRODUCTION TECHNOLOGY

(2008 Course) (411123) (Sem. - I)

Time : 3 Hours] *[Max. Marks : 100*

Instructions to the candidates:

1) *Answer 3 questions from section-I and 3 questions from section-II.*
2) *Answer to the two sections should be written in separate books.*
3) *Neat diagrams must be drawn wherever necessary.*

SECTION - I

Q1) a) Explain following physical aspect of high speed machining with neat sketch : **[12]**

    i) Chip removal temperature.

    ii) Machining characteristics of HSM technology.

    iii) Theoretical behaviour of cutting force and cutting speed.

    b) Explain cutting speed ranges for seven typical machining operation and materials of different machinability rating. **[6]**

OR

Q2) a) Explain selection criteria of high speed machining on the basis of : **[9]**

    i) Machine and spindle.

    ii) Tooling interface.

    iii) Cutting tools.

    b) Explain in brief : **[9]**

    i) Dry and semi dry machining.

    ii) Hard part machining.

Q3) Explain with neat sketch following Nanotechnology fine finishing processes : **[16]**

    a) Abrasive Flow Machining (AFM).

    b) Magnetic Abrasive Finishing (MAF).

OR

Q4) Write a short note on : [16]

    a) Nanometrology.

    b) Examples of nano products.

    c) Magnetic flow polishing.

Q5) a) Explain enterprise resource planning with flow chart for integrating ERP module. [8]

    b) Explain material resource planning with flow chart. [8]

<div align="center">OR</div>

Q6) Write a short note on : [16]

    a) Rapid prototyping.

    b) Inventory control.

    c) Group Technology.

<div align="center"><u>SECTION - II</u></div>

Q7) a) Explain the characteristics of in-line transfer and rotary transfer line mechanism and their field of application. [6]

    b) Explain following feeders used in factory automation. [12]

       i) Vibratory bowl feeder.
       ii) Centrifugal feeder.
       iii) Rotary disc feeder.

<div align="center">OR</div>

Q8) a) Explain function of automated storage and retrieval system and mention following points : [10]

       i) Components.
       ii) Reason of AS/RS.
       iii) Design criteria of AS/RS

    b) Explain automated guided vehicles : [8]

       i) Types of AGVS.
       ii) AGVS guidance system.

Q9) a) Draw a neat sketch and explain the working of pilot operated pressure relief valve. [8]

    b) Explain with neat sketch Hydraulic sequence valve with their application. [8]

Q10) a) Differentiate between Hydraulic and pneumatic systems. **[6]**

b) What are the various types of filtration technology. **[8]**

c) Define + ve displacement pump. **[2]**

Q11) Explain with neat sketch following pneumatics components (any two) :
[16]

a) Lubricator.
b) 5/3 hand operated direction control valve.
c) Quick Exhaut valve.

OR

Q12) a) Draw the following Hydraulic circuits : **[12]**

i) Meter in.
ii) Meter out.
iii) Regenerative.
iv) Bleed off.

b) Draw following pneumatic circuit by using following components. (any one) : **[4]**

i) AND Gate.
ii) OR Gate.

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P634

[4064]-456

B.E. (Production S/W)
PRODUCT DEVELOPMENT
(2008 Course) (Elective - II) (411125 (D)) (Sem. - I)

Time : 3 Hours] *[Max. Marks : 100*

Instructions to the candidates:

1) *Answer Q. No. 1 or Q. No. 2, Q. No. 3 or Q. 4, Q. No. 5 or Q. No. 6 from section-I and Q. No. 7 or Q. No. 8, Q. No. 9 or Q. No. 10, Q. No. 11 or Q. No. 12 from section-II.*
2) *Answers to the two sections should be written in separate books.*
3) *Neat diagrams must be drawn wherever necessary.*
4) *Figures to the right indicate full marks.*
5) *Assume suitable data, if necessary.*
6) *Use of logarithmic tables, slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.*

SECTION - I

Unit - I

Q1) a) Differentiate between Product Development and Product Design. **[6]**

b) What is Rapid Prototyping? Explain in detail types of rapid prototyping.**[6]**

c) Explain Standardization, Simplification and Specialization in product design. **[6]**

OR

Q2) a) Explain Product Verification and Product Validation in short with example. **[8]**

b) What is modern product development process? Explain role of product development team in product development planning with reference to ISO standard. **[10]**

Unit - II

Q3) a) What do you mean by Technology Forecasting? Explain S-curve in short. **[8]**

b) What are the types of customer needs, what do you mean by customer satisfaction and explain effect of customer satisfaction on product design? **[8]**

P.T.O.

Q4) a) What are the different methods of gathering customer needs information? How will you analyze the information? **[8]**

b) Write short notes on : **[8]**

i) Market Segmentation.
ii) Economic Analysis of Product.

Unit - III

Q5) a) Explain the different steps of product development based on product function? **[8]**

b) Explain augmentation and aggregation in short. **[8]**

OR

Q6) a) Describe Pugh's Concept in detail with example? **[8]**

b) Write short notes on : **[8]**

i) FMEA.
ii) Concept selection process.

SECTION - II

Unit - IV

Q7) a) What is reverse engineering? What are its advantages and disadvantages? **[6]**

b) What is product tear down process and explain its different methods.**[6]**

c) Explain benchmarking approach and its procedure in detail. **[6]**

OR

Q8) a) What is indented assembly cost analysis and explain function form diagrams. **[9]**

b) What is product portfolio and architecture explain with suitable example. **[9]**

Unit - V

Q9) a) What is design for manufacture (DFM)? Explain the general principles to be followed while designing the parts for manufacture. **[8]**

b) Explain phases of product life cycle with its corresponding technologies. **[8]**

OR

Q10) a) What is product testing and explain following terms : **[8]**

      i)   Field trials.

      ii)   Virtual Trial.

      iii)   Iterations.

    b) Explain the guidelines to be followed in the design of the parts for the following processes : **[8]**

      i)   Casting.

      ii)   Forging.

Unit - VI

Q11) a) Explain the significance of PLM in detail. **[8]**

    b) What is product life cycle? Why it is necessary? Explain its components in detail. **[8]**

<div align="center">OR</div>

Q12) a) Explain in short Reliability Concept in product development. **[8]**

    b) Write short notes on : **[8]**

      i)   Product data and Product work flow.

      ii)   Importance of customer involvement.

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[4064]-461

B.E. (Electrical)

PLC AND SCADA APPLICATION

(2008 Course) (403141) (Sem. - I)

Time : 3 Hours] *[Max. Marks : 100*

Instructions to the candidates:

1) *Answer any one question from each pair of questions Q. 1 and Q. 2, Q. 3 and Q. 4, Q. 5 and Q. 6, Q. 7 and Q. 8, Q. 9 and Q. 10, Q. 11 and Q. 12.*
2) *Answers to the two sections should be written in separate books.*
3) *Neat diagrams must be drawn wherever necessary.*
4) *Figures to the right indicate full marks.*

SECTION - I

Q1) a) Define programmable Logic Controller. **[2]**

b) Draw block diagram of PLC and explain each block in detail. **[8]**

c) State advantages and disadvantages of PLC. **[7]**

OR

Q2) a) What are different selection criteria for PLC? **[4]**

b) What are different sections of CPU? Explain in detail. **[7]**

c) Write a short note on I/O modules of PLC? **[6]**

Q3) a) Explain with symbols different types of switches. **[8]**

b) Draw ladder diagram for the following function table. **[8]**

Inputs - I_1, I_2
Outputs - Q_1, Q_2, Q_3, Q_4

I_1	I_2	Q_1	Q_2	Q_3	Q_4
0	0	1	1	0	0
0	1	0	1	1	0
1	0	0	0	1	1
1	1	1	0	0	1

OR

Q4) a) State and explain Input ON/OFF and analog devices. **[8]**

b) Draw ladder diagram for the following function table. **[8]**

Inputs - I_1, I_2
Outputs - Q_1, Q_2, Q_3, Q_4

I_1	I_2	Q_1	Q_2	Q_3	Q_4
0	0	1	1	1	0
0	1	0	1	1	1
1	0	1	0	1	1
1	1	1	1	0	1

Q5) a) With proper block diagram and response curves explain PID control for closed loop system. **[9]**

b) Using solid state device, explain any one method of DC motor speed control. **[8]**

OR

Q6) a) What is PID tuning? How it is achieved? **[9]**

b) Explain variable speed (variable frequency) AC motor drive. **[8]**

SECTION - II

Q7) a) Explain SCADA system architecture in detail. **[9]**

b) What are SCADA system desirable properties. **[8]**

OR

Q8) a) Define : **[9]**

i) SCADA.
ii) RTU.
iii) HMI.
iv) MTU.

b) State advantages and disadvantages of SCADA system. **[8]**

Q9) a) With block diagram explain how SCADA system is used in Automatic sub-station control. **[8]**

b) Explain how SCADA system is used in water purification system. **[8]**

OR

Q10) a) What are different system operating states in power system? **[8]**

b) Explain how SCADA system is used in Electric Power Generation. **[8]**

Q11) a) Explain Open System Interconnection (OSI) model. Also explain functions of OSI model layers and OSI protocols. **[9]**

b) Write a short note on : **[8]**

DeviceNet.

<div align="center">OR</div>

Q12) a) Explain TCP/IP layered architecture. Also explain functions of TCP/IP model layers and TCP/IP protocols. **[9]**

b) Explain different versions of profibus and their protocols. **[8]**

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[4064]-466

B.E. (Electrical)

PROJECT MANAGEMENT

(2008 Course) (Elective - I) (Sem. - I) (403143 D)

Time : 3 Hours]   *[Max. Marks : 100*

Instructions to the candidates:

1) *Section-I and Section-II should be answered on separate answer sheets.*
2) *Figures to the right indicate maximum marks allotted for the respective question.*
3) *Use of scientific calculator is allowed.*

SECTION - I

Q1) Define project and explain its various characteristics. Discuss different types of project organisations. **[16]**

OR

Q2) Explain various phases of project life cycle and discuss various types of project. **[16]**

Q3) Explain various costs associated with a project. What methods you would use to ascertain financial viability of a project? **[16]**

OR

Q4) "Many projects failures are due to casual cost estimation and loose cost control". Explain and point out all possible causes of project failures. **[16]**

Q5) Write short notes on : **[18]**

a) Gantt chart.
b) Graphical Evaluation and Review Technique (GERT).
c) Resource Allocation.

OR

P.T.O.

Q6) Arcot machinery company has received a contract to build and deliver a machine. The contract price varies with delivery time as follows. Normal delivery time is 16 weeks for a contract price of Rs.62000 = 00. **[18]**

Contract Delivery Time (weeks)	Contract Price (Rs.)
15	62500 = 00
14	65000 = 00
13	70000 = 00
12	72500 = 00

The data for the network is given below :

Activity	Normal Time (weeks)	Normal cost (Rs.)	Crash Time (weeks)	Crash cost (Rs.)
1 - 2	3	5000	1	9000
2 - 3	4	8000	3	14000
2 - 4	3	4000	2	6000
2 - 5	8	5000	7	6000
3 - 6	4	3000	2	5000
4 - 6	6	2000	4	3600
5 - 7	5	10, 000	4	14000
6 - 7	3	7000	1	10600

Recommend an appropriate delivery schedule.

SECTION - II

Q7) Write short notes on : **[16]**

a) Elements of Budgets and Estimates.
b) Budgetary Control.

OR

Q8) Write short notes on : **[16]**

a) Factors of cost escalation.
b) project cost accounting systems.

Q9) What is the importance of quality of procured items? Describe the techniques of quality assurance and control used to achieve desirable project quality.**[16]**

OR

Q10) Describe the process of project quality management. **[16]**

Q11) "Projects are invariably subject to risks". Explain various types of risks and the way they are managed. **[18]**

OR

Q12) Explain techniques involved in the assessment of risk in a project with suitable examples. **[18]**

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[4064]-467

B.E. (Electrical)
RESTRUCTURING AND DEREGULATION
(2008 Course) (Elective - II) (403144 (A) (Sem. - I)

Time : 3 Hours]   *[Max. Marks : 100*

Instructions to the candidates:

1) *Answer any three questions from each section.*
2) *Answers to the two sections should be written in separate books.*
3) *Neat diagrams must be drawn wherever necessary.*
4) *Figures to the right indicate full marks.*
5) *Use of electronic pocket calculator is allowed.*
6) *Assume suitable data, if necessary.*

SECTION - I

Q1) a) Explain functions of following institutions :   **[8]**

    i)   Central Electricity Authority (CEA).
    ii)   Ministry of Power.

    b) Explain the challenges before Indian power sector.   **[8]**

OR

Q2) a) Explain the objectives of 'Electricity Act 2003'. Also explain the guidelines under this act.   **[8]**

    b) Explain the structure and working of Indian Energy Exchange (IEX).**[8]**

Q3) a) Explain following basic concepts of economics of power sector :   **[10]**

    i)   Return in equity.
    ii)   Depreciation.
    iii) Interest and finance charges.
    iv) Profitability indices.

    b) Explain avoided cost, marginal cost.   **[6]**

OR

Q4) a) State desirable characteristics of tariff and also factors governing the tariff structutre.   **[8]**

    b) Explain different methods to assess the financial feasibility of any project.
                        [8]

P.T.O.

Q5) Explain following methods of regulations : **[18]**

   a) Rate of return regulation.

   b) Performance based regulation.

   c) Incentive regulation.

   d) Benchmarking or Yardstick regulation.

<div align="center">OR</div>

Q6) a) Explain the non-price issues in regulation. **[8]**

   b) Explain the role of State Electricity Regulatory Commission and Central Electricity Regulatory Commission. **[10]**

<div align="center"><u>**SECTION - II**</u></div>

Q7) a) Explain following models based on industry structure. **[8]**

     i) Wholesale Competition.
     ii) Retail Competition.

   b) Explain following models based on contractual arrangements. **[8]**

     i) Pool and bilateral trade.
     ii) Multi-lateral trade.

<div align="center">OR</div>

Q8) a) Compare between 'competition for the market' and 'competition in the market'. **[8]**

   b) Explain the electricity reform occurred in India. **[8]**

Q9) Write short note on trading models : **[16]**

   a) Integrated trading model.

   b) Wheeling trading model.

   c) Decentralized trading model.

<div align="center">OR</div>

Q10) a) Explain retail competition. Also explain the retail access framework. **[8]**

   b) Explain the impact of reform on regulation and externalities. **[8]**

Q11) a) Explain the necessity of transmission planning with reference to market structure. Also explain the concept of transmission rights. **[9]**

   b) Explain transmission congestion issues and management of transmission-congestion. **[9]**

<p style="text-align:center">OR</p>

Q12) a) Explain the working of Independent System Operator (ISO) and Load Dispatch Center (LDC). **[9]**

b) Explain how with the implementation of Availability Based Tariff, the grid operation is improved in Indian power sector. **[9]**

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[4064]-471

B.E. (Electrical)
CONTROL SYSTEM - II
(2008 Course) (Sem. - I) (403145)

Time : 3 Hours] *[Max. Marks : 100*

Instructions to the candidates:

1) *Answer three questions from Section I and three questions from Section II.*
2) *Answers to the two sections should be written in separate books.*
3) *Use of logarithmic tables slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.*

SECTION - I

Q1) a) Derive transfer function of lead network. Show its pole zero configuration. **[6]**

b) A unity feedback system has $G(s) = \dfrac{10}{s(s+1)}$. Design a lead compensator to satisfy following performance specifications **[12]**
   i) kV = 20/sec.
   ii) Phase Margin $\geq 50^o$
   iii) Gain Margin $\geq 10db$

OR

Q2) a) Compare lead and lag compensator. **[6]**

b) Design a lag compensator for unity feedback system with

$G(s) = \dfrac{K}{s(s+1)(0.2s+1)}$ to meet following specifications. **[12]**
   i) kV = 8/sec.
   ii) Phase Margin = 40°.

Q3) a) Obtain eigen values, eigen vector and modal matrix for **[8]**

$$A = \begin{bmatrix} -9 & 1 & 0 \\ -26 & 0 & 1 \\ -24 & 0 & 0 \end{bmatrix}$$

b) Find State transition matrix for **[8]**

$$A = \begin{bmatrix} 0 & 1 \\ -1 & 0 \end{bmatrix}$$

OR

Q4) a) Derive solution of non homogeneous state equation. **[8]**

b) For the system shown find solution X(*t*) **[8]**

$$\dot{X} = \begin{bmatrix} -2 & 0 \\ 0 & -3 \end{bmatrix} X + \begin{bmatrix} 1 \\ 1 \end{bmatrix} u(t)$$

$$X(0) = \begin{bmatrix} 0 \\ 1 \end{bmatrix}$$

Q5) a) Define controllability and explain methods to determine controllability of system. **[8]**

b) Determine controllability and observability of following system. **[8]**

$$\dot{X} = \begin{bmatrix} 0 & 1 & 0 \\ 0 & 0 & 1 \\ 0 & -2 & -3 \end{bmatrix} X + \begin{bmatrix} 0 \\ 0 \\ 1 \end{bmatrix} u$$

$$y = \begin{bmatrix} 3 & 4 & 1 \end{bmatrix} X$$

OR

Q6) a) A system is given by $\dot{X} = AX + Bu$ **[8]**

$$A = \begin{bmatrix} 0 & 1 & 0 \\ 0 & -1 & 1 \\ 0 & -1 & -10 \end{bmatrix} \quad B = \begin{bmatrix} 0 \\ 0 \\ 10 \end{bmatrix}$$

Obtain a state feedback gain controller so that $r_i = 0.5$ & $w_n = Z$ rad/sec.

b) What is need of state observer. Explain design of full order state observer. **[8]**

SECTION - II

Q7) a) Explain P, PI, PID controller and its effect on system performance. **[8]**

b) Design a PID controller for $G(s) = \dfrac{1}{s(s+4)(s+3)}$ and get values of K_p, T_i & T_d **[8]**

Q8) a) Explain Ziegler Nichols rules for tuning of PID controller. **[8]**

b) For a unity feedback system $G(s) = \dfrac{6.63K}{s(s+1.71)(s+100)}$ design a PID controller to meet following specifications. **[8]**

Mp = 25% overshoot, ts = 2 sec, kv = 20

Q9) a) Derive describing function of relay with dead zone. **[8]**

b) Explain terms : **[8]**
   i) Limit cycle.
   ii) Subharmonic oscillation.
   iii) Asynchronous quenching.

Q10) a) Classify different commonly occurring nonlinearities. Explain with their input output characteristics. **[8]**

b) In a unity feedback system a relay with dead zone is connected in cascade with $G(s) = \dfrac{10}{s(s+1)(s+4)}$. The relay has dead zone of $\pm$ 0.5 unit and gives output of $\pm$ 1 unit for input signal beyond the dead zone region. Using describing function method determine the amplitude and frequency of limit cycle if it exists. **[8]**

Q11) a) Discuss the different types of singular points that occur in phase plane method. **[6]**

b) Draw the phase plane trajectory for the system with unity feedback and $G(s) = \dfrac{1}{s(s+2)}$ in cascade with relay with dead zone. Relay has dead zone of ± 0.5 unit and gives o/p of ± 1 unit for i/p beyond dead zone region. **[12]**

Q12) a) Explain terminologies used for Scalar function : **[6]**
   i) Positive definite
   ii) Negative definite

iii) Positive semidefinite

iv) Negative semidefinite with one example each.

b) Explain Liapunov's second method and Liapunov's stability theorem.**[6]**

c) Explain terms : **[6]**

i) Stability.

ii) Asymptotic stability.

iii) Asymptotic stability in the large.

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[4064]-538

B.E. (Chemical)
CHEMICAL PROCESS SYNTHESIS
(2008 Course) (Elective - II) (Sem. - I) (409342(A))

Time : 3 Hours]   *[Max. Marks : 100*

Instructions to the candidates:

  1) *Answers to the two sections should be written in separate answer books.*
  2) *Neat diagrams must be drawn wherever necessary.*
  3) *Figures to the right indicate full marks.*
  4) *Use of logarithmic tables slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.*
  5) *Assume suitable data, if necessary.*

SECTION - I

Q1) a) Explain two approaches of chemical process design.   **[8]**

   b) Explain in short overall process design.   **[8]**

OR

Q2) a) Discuss idealized reactor model.   **[8]**

   b) Explain in short different parameters in choice of reactor.   **[8]**

Q3) a) Describe various parameters to analyze reactor performance.   **[8]**

   b) Discuss choice of reactors for parallel reaction system.

   Feed 1 + Feed 2 $\rightarrow$ product
   Feed 1 + Feed 2 $\rightarrow$ byproduct

   For $a_1 > a_2$ and $a_1 < a_2$ where a_1 & a_2 are the order of primary and secondary reaction respectively.   **[8]**

OR

Q4) a) Discuss principle, working and construction of cyclone separator and hydrocyclone separator.   **[8]**

   b) Draw different possible arrangements for a multistage evaporator and explain principle degrees of freedom in evaporator design.   **[8]**

Q5) a) What are the four methods of separation of heterogeneous mixture, explain any one in detail. **[10]**

 b) Discuss various types of dryers. **[8]**

<div align="center">OR</div>

Q6) Write short notes on : **[18]**

 a) Absorption.

 b) Fluidized bed catalytic reactor.

 c) Practical reactor.

<div align="center">

SECTION - II
</div>

Q7) a) Discuss heuristics used for the sequence selection for simple distillation columns. **[8]**

 b) Discuss heat integration of sequences of simple distillation column. **[8]**

<div align="center">OR</div>

Q8) a) Discuss integration of refrigeration cycle. **[8]**

 b) Explain threshold problems in heat exchanger network. **[8]**

Q9) a) Explain composit curves with suitable example related to heat recovery problems. **[8]**

 b) What is simple furnace method. **[8]**

<div align="center">OR</div>

Q10) a) Discuss combined heat and power generation. **[8]**

 b) Explain the concept of table Algorithm. **[8]**

Q11) a) Discuss major hazards in process plants. **[6]**

 b) What are safety and health considerations. **[6]**

 c) Explain schematically servo reaction system. **[6]**

<div align="center">OR</div>

Q12) a) Unconfined vapour cloud explosion.

 b) Hazard triangle.

 c) Safety devices. **[18]**

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[4064]-575

B.E. (Polymer Engg.)
POLYMER COMPOUNDING
(2008 Course) (409361) (Sem. - I)

Time : 3 Hours]　　　　　　　　　　　　　　　*[Max. Marks : 100*

Instructions to the candidates:

1) *Answer question number 1 or 2, 3 or 4 and 5 or 6 from section-I. Answer question number 7 or 8, 9 or 10 and 11 or 12 from section-II.*
2) *Answers to the two sections must be written in separate answer books.*
3) *Figures to the right indicate full marks.*
4) *Draw neat sketches wherever required.*
5) *Use of calculator, graph paper is allowed.*
6) *Assume suitable data, if required.*

SECTION - I

Q1) a) Write in short about striation thickness as a measure of mixing. **[4]**

b) Define in short : **[4]**

    i) Compounding.
    ii) Kneading.
    iii) Mastication.
    iv) Intensive mixing.

c) Write in short about mixing in any one type of blending equipment. **[4]**

d) Give general features or requirements of dispersive and distributive type of mixing. **[4]**

OR

Q2) a) Explain why state of admixture need to be evaluated statiscally. Give mixing indices propused by various researches and also give physical significance of each. **[8]**

b) Write in detail about mixing mechanisms and kinetics of mixing with suitable examples of mixing in polymers. **[8]**

Q3) a) State the Hildebrand-Scott equation. Explain the various terms. **[6]**

b) Explain and write in short about following terms : **[6]**

    i) Polymer blends and alloys.
    ii) Miscible and immiscible blends.
    iii) Compatabilization.

P.T.O.

c) Write a note on compounding of polymers with high aspect ratio fillers.**[4]**

OR

Q4) a) List the various factors affecting melting and dispersion of fillers. Explain the mechanism of coupling between filler and polymers with silane coupling agents. **[6]**

b) State various methods for preparation of clay nanocomposites. Explain any two in detail. **[6]**

c) Explain in short role of compounding in development of new material grades. **[4]**

Q5) a) Explain in detail the mechanism of action of heat stabilizers, UV stabilizers and anti-oxidants. **[9]**

b) Write a note on various types of nanofillers used in nanocomposites.**[9]**

OR

Q6) a) Explain in detail classification of fillers with examples. **[6]**

b) Write in short about compounding of polyolefins. **[4]**

c) Indicate the mechanism of working of following ingradients. Comment on compounding and mixing practices. **[8]**

    i) Blowing agents.
    ii) Cross linking agents.
    iii) Colourants.
    iv) Biocides.

Give suitable examples.

SECTION - II

Q7) a) Write a note on compounding of EPDM and butyl rubber. **[5]**

b) Write down formulations for PVC cable compound and profile extrusion compound. Explain the significance of each ingradient. How do cable compounds differ from those used for profile extrusion? **[6]**

c) What is reactive extrusion? State merits and applications. **[5]**

OR

Q8) a) Explain free radical grafting of monomer onto polymer by reactive extrusion with a relevent example. **[6]**

b) Write down formulation for low cost general purpose polyester dough moulding compound. Explain the significance of each and mention sequence of addition during compounding. **[6]**

c) List major ingradients used in formulation of rubber compounds. Explain their significance and objective of use. **[4]**

Q9) a) Draw neat sketch and explain the type of mixing achieved of following mixing sections in single screw extrusion. **[8]**

    i) Pin Mixing section.
    ii) Slotted flight mixers.

b) Explain mixing mechanism, residence time distribution and self wiping action of Ko-Kneader. **[8]**

OR

Q10) a) With a neat sketch, explain design features, mixing action and flight designs of CRD mixer. **[8]**

b) Explain the type of mixing achieved in blister rings. **[4]**

c) Explain in short effect of pressure drop across mixing section. **[4]**

Q11) a) Draw comparison between single screw and twin screw extruders with respect to conveying mechanism, melting mechanism and shearing action. **[4]**

b) Write a note on melting mechonism in counter rotating twin screw extruder. **[4]**

c) With a neat sketch, explain the use of barrels with internal pins. **[5]**

d) Write features of PVC compounding with twin screw extruder. **[5]**

OR

Q12) a) With reference to two roll mill, write in short about : **[8]**

    i) Mixing action.
    ii) Fraction of broken agglomerate and agglomerate size distribution.
    iii) At least one cross mixing device.
    iv) Mixing optimisation.

b) Discuss intensive non-fluxing mixers and give at least two blade designs with applications. **[5]**

c) Write in short about use of smear heads. **[5]**

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