VARDHAMAN COLLEGE OF ENGINEERING
(AUTONOMOUS)
Four Year B. Tech IV Semester Regular Examinations June - 2013
(Regulations: VCE-R11)
BUILDING PLANNING AND DRAWING
(Civil Engineering)

Time: 3 hours   Max Marks: 75

Answer ONE question from each Unit
All Questions Carry Equal Marks
All parts of the question must be answered in one place only

Unit - 1

1. a) What do you understand by building by-laws? Explain the necessities of building by-laws.   7M
    b) Write a note on lighting and ventilation requirements of a building.   8M

2. a) Write a brief note on   10M
        i.   FAR
        ii.   FSI
    b) How do you justify the open area requirements for a building? Explain briefly.   5M

Unit - 2

3. a) List out various component of residential Building with their standard sizes.   7M
    b) Discuss briefly the requirements of   8M
        i.   Hospital building
        ii.   Hotel building

4. a) Explain briefly principles of planning of a building.   7M
    b) Discuss various requirements of 1) Office building 2) Educational institution building.   8M

Unit - 3

5. a) Explain the stages of a construction project and construction management team.   7M
    b) Write a short note on network technique and Programme Evaluation and Review Techniques in construction management.   8M

6. What is critical path method? Write the advantages of CPM. Differentiate between CPM and PERT.   15M

Unit - 4

7. a) Write the sign conventions for brick, stone, plaster, concrete, alluminium, earth and rock.   7M
    b) Explain English bond and Flemish bond with neat sketch.   8M

8. Draw the following (Any three):   15M
    i.   Panelled and glazed door
    ii.   Glazed window
    iii. King post truss
    iv.   Queen post truss

Unit - 5

9.   For the line diagram given below, draw the plan, elevation and section along X-X. assume   15M
      suitable dimensions for foundations, doors and windows etc.
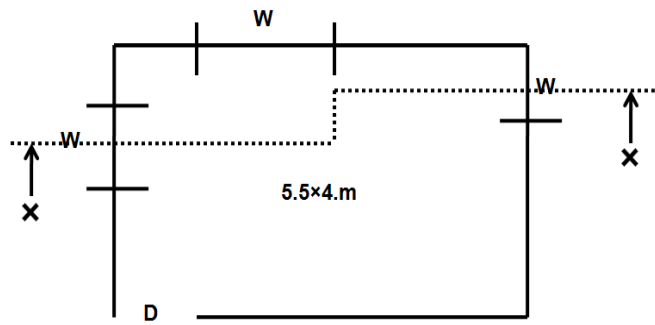
10.   For the given line diagram, draw   15M
      i.   Plan
      ii.   Section along A-A
      iii. Elevation
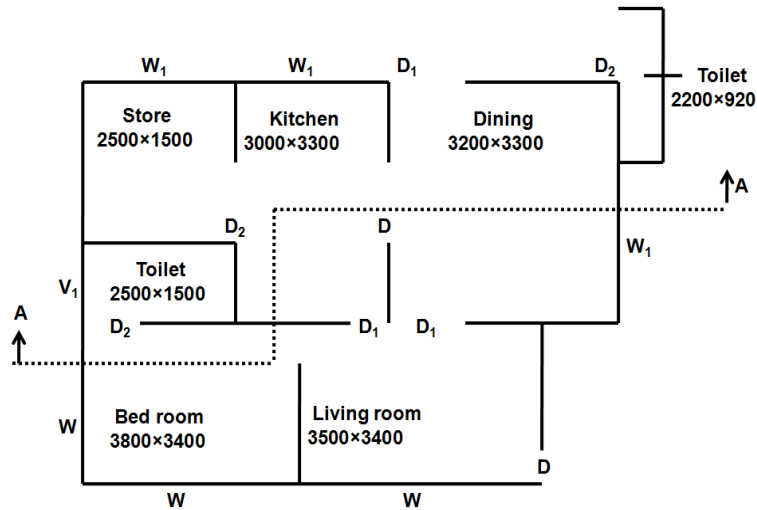
D= 1100x2200   W=1500x1350   V=610x460
D1=920x2200   W1=1300x1350   V1=920x460
D2=760x2200
(All dimensions are in mm and all are internal dimensions)

VARDHAMAN COLLEGE OF ENGINEERING
(AUTONOMOUS)
Four Year B. Tech IV Semester Regular Examinations June - 2013
(Regulations: VCE-R11)
OPERATING SYSTEMS
(Common to Computer Science and Engineering & Information Technology)

Time: 3 hours   Max Marks: 75

Answer ONE question from each Unit
All Questions Carry Equal Marks
All parts of the question must be answered in one place only

Unit - 1

1. a) Explain the various services provided by an Operating System that are designed to make it more convenient for users to use the computer system.　8M
    b) What are the various components of an Operating System? Explain any two in detail.　7M

2. Consider the following jobs and CPU burst time given in milliseconds　15M

Process	Burst time	Priority
P1	10	3
P2	1	1
P3	2	3
P4	1	4
P5	5	2

    The processes are arrived in the order P1, P2, P3, P4, P5 all at time 0.
    i.   Draw four Gantt charts illustrating the execution of these processes using FCFS, SJF, a nonpreemptive priority (a smaller priority number implies a higher priority), and RR (quantum =1) scheduling.
    ii.   What is the turnaround time of each process for each of the scheduling algorithms in part (I)?
    iii. What is the waiting time of each process for each of the scheduling algorithm in part (I)?
    iv.   Which of the schedules in part(I) results in a minimal average waiting time(over all processes)?

Unit - 2

3. Consider a system with five process P_1 to P_5 and three resource types P, Q and R. resource type P has 7 instances, resource type Q has 5 instances, and resource type R has 10 instances. Suppose that at time T_0, the following snapshot of the system has been taken:　15M

	Allocation			Max			Available		
	P	Q	R	P	Q	R	P	Q	R
P_1	0	1	0	3	5	7	2	3	3
P_2	0	0	2	2	2	3			
P_3	2	0	3	2	0	9			
P_4	1	1	2	2	2	2			
P_5	2	0	0	3	3	4			

    Answer the following questions.
    i.   What is the content of need matrix?
    ii.   Is the system in safe state?
    iii. If a request from process P_1 arrives for (0,2,0), can this request be granted immediately?
    iv.   If a request from process P_4 arrives for (0,3,3), can this request be granted immediately?

4.   a)   Explain the deadlock prevention methods.   10M

      b)   What do you mean by a semaphore? How do you access it?   5M

Unit - 3

5.   a)   List the common file types along with its extensions and describe each file type.   10M

      b)   Explain the difference between internal fragmentation and external fragmentation.   5M

6.   a)   Consider the page reference string 7,0,1,2,0,3,0,4,2,3,0,3,2,1,2,0,1,7,0,1. How many page faults would occur for the following pages replace algorithms by considering 3 frames?   10M

          i) FIFO   ii) LRU   iii) Optimal

      b)   Explain the different file allocation methods.   5M

Unit – 4

7.   a)   Consider the following I/O scenarios on a single – user PC.   8M

          i.   A mouse used with a graphical user interface

          ii.   A tape drive on a multitasking operating system (assume no device preal location is available)

          iii.   A disk drive containing user files

          iv.   A graphics card with direct bus connection, accessible through memory – mapped I/O

         For each of these I/O scenarios, would you design the operating system to use buffering, spooling, caching, or a combination? Would you use polled I/O, or interrupt driven I/O? Give reasons for your choice

      b)   How do you choose an optimal technique among the various disk scheduling techniques? Explain.   7M

8.   a)   Explain in detail about interrupts and interrupt handling features.   8M

      b)   Explain with a diagram the steps in DMA transfer.   7M

Unit - 5

9.   a)   What is access matrix? Explain with neat figure, also explain one of the implementation methods of access matrix.   10M

      b)   Protection from viruses is an important security concern. Justify.   5M

10.   a)   List and explain security violations of a system.   10M

      b)   Explain how firewall is used to protect systems and networks.   5M

VARDHAMAN COLLEGE OF ENGINEERING
(AUTONOMOUS)
Four Year B. Tech IV Semester Regular Examinations June - 2013
(Regulations: VCE-R11)
COMPUTER ARCHITECTURE AND ORGANISATION
(Common to Computer Science and Engineering, Information Technology, Electrical and Electronics Engineering and Electronics and Communication Engineering)

Time: 3 hours   Max Marks: 75

Answer ONE question from each Unit
All Questions Carry Equal Marks
All parts of the question must be answered in one place only

Unit - 1

1. a) Describe basic operational concepts of computer in detail.   7M
   b) i.   Perform 2's complement Addition, Subtraction between the signed Decimal   5M
           number +66, -25 using 8 Bit representation.
      ii. Convert $(101.11011)_2$ into Decimal, Octal, Hexadecimal.   3M

2. a) Design 3-to-8 line decoder with truth table.   8M
   b) What is bus? Explain bus structure with single bus and double bus structure.   7M

Unit - 2

3. a) What do you mean by addressing mode? Explain the following addressing modes.   10M
      i.   Index addressing mode   ii. Relative addressing mode.
      iii. Direct addressing mode   iv. Immediate addressing mode
   b) Write a note on interrupts.   5M

4. a) With a neat block diagram, explain how the basic computer registers are connected to   10M
      the common bus.
   b) Explain the basic computer instruction formats.   5M

Unit - 3

5. a) Explain how control signals are generated using micro programmed control unit. Write   10M
      the circuit required for the generation of Zin Control Signal.
   b) Divide 17 by 5 using Restoring division technique.   5M

6. a) Multiply the following numbers using booths algorithm.   6M
      i. -13 X 9   ii.   -02 X -02
   b) With a neat block diagram, explain the multiplication of positive numbers using array   9M
      multiplier.

Unit – 4

7. a) Describe the use of DMA controllers in a computer system.   8M
   b) The access time of a cache memory is 100 ns and that of main memory 1000 ns. It is   7M
      estimated that 80 percent of the memory requests are for read and the remaining 20
      percent for write. The hit ratio for read accesses only is 0.9. A Write-through procedure
      is used
      i.   What is the average access time of the system considering only memory read
            cycle?
      ii.   What is the average access time of the system for both read and write requests?
      iii. What is the hit ratio taking into consideration the write cycles?

8. a) Explain organization of a 1 K X 1 memory chip with neat diagram.   7M
    b) An address space is specified by 24 bits and the corresponding memory   space by 16   8M
        bits.
        i.   How many words are there in the address space?
        ii.   How many words are there in the memory space?
        iii. If a page consists of 2K words, how many pages and blocks are there in the
              system?

Unit - 5

9. a) Explain the following interconnection networks in detail.   10M
        i.   Multiport Memory
        ii.   Crossbar switch
    b) Differentiate between Synchronous and asynchronous bus.   5M

10. a) Explain the following Dynamic arbitration algorithms.   10M
        i.   LRU
        ii.   Time slice
        iii. Polling
        iv.   Rotating daisy chain
    b) How the cache coherence problem is resolved by a snoopy cache controller?   5M

VARDHAMAN COLLEGE OF ENGINEERING
(AUTONOMOUS)
Four Year B. Tech IV Semester Regular Examinations June - 2013
(Regulations: VCE-R11)
DATABASE MANAGEMENT SYSTEMS
(Common to Computer Science and Engineering & Information Technology)

Time: 3 hours | | **Max Marks: 75**

Answer ONE question from each Unit
All Questions Carry Equal Marks
All parts of the question must be answered in one place only

Unit - 1

1. a) Discuss the main characteristics of the database approach. How does it differ from the traditional file system? — 7M

   b) Define data independence and What is the difference between logical data independence and physical data independence ? — 8M

2. a) List the steps of mapping algorithm of ER to Relational Model. Discuss the mapping rules for Regular entity, Weak entity and Multi-valued attributes. — 7M

   b) Draw an E-R diagram for BANK database. Make suitable assumptions and use them in showing cardinality ratios and participation constraints. The data requirements are summarized as follows: — 8M

      i. Each bank is identified by a unique number and bank name and address are also recorded.

      ii. Each bank has many branches having branch number and address. Branches depend on bank for its identification. Each bank may have multiple accounts and loans.

      iii. Each account is identified by unique account number. Type and balance of accounts must be recorded.

      iv. Each loan is identified by unique loan number. Type and amount of loans must be recorded.

      v. The bank keeps track of a customer by his SSN, name address, and phone number. Age is used as a factor to check whether he is major. A customer can open different accounts with the bank. A customer can take out more than one type of loan.

Unit - 2

3. a) Consider the following database and answer the given queries using relation algebra. — 8M
      part (pnum, pname, price)
      customer (cnum, cname, street, zip, phone)
      employee (enum, ename, zip, hire_date)
      zip_code (zipcode, city)
      order (eno, cno, pno, odate)

      i. Find the part number and order dates for the parts whose cost is more than Rs. 1000.

      ii. Find the customer names and their phone number who have purchased 'microwave' from employee 'John'.

      iii. Find the names and hire date of employees who have delivered more than 2 orders.

   b) Differentiate between theta join, equi join and natural join. — 7M

4. a) consider the database given in Q-3(a) and answer the given queries using SQL: — 8M
      i. Find the name, street of the customer whose name is 'ASHOK' and phone number is 9988776655.

      ii. Find the name and city of employees who have been hired before 26-jan-2010.

      iii. Find the name and phone number of the customers who have placed more than 2 orders.

      iv. Find the pair of customer names who live in same city.

b) Explain domain constraint and referential integrity constraint for relational model in detail with example.   7M

Unit - 3

5. a) What is normalization? Explain various normal forms with example.   8M
    b) Explain various update anomalies due to poor database design.   7M

6. Suppose a relation R with four attributes A B C D. For each of the following sets of FDs, assuming those are the only dependencies that hold for R, do the following   15M
    a) Identify the candidate key(s) for R.
    b) Identify the best normal form that R satisfies (1NF,2NF,3NF or BCNF)
    c) If R is not in BCNF, decompose it into a set of BCNF relations that preserve the dependencies.
    i.   C -> D , C -> A,   B -> C
    ii. B -> C, D -> A
    iii. ABC -> D, D -> A
    iv. A -> B , BC -> D , A -> C
    v.   AB -> C , AB -> D , C -> A , D -> B

Unit - 4

7. a) Describe the anomalies due to interleaved executions in terms of two transactions T1 and T2.   7M
    b) When the system restarted after the crash, what are different phases proceeded by recovery manager explain the tasks performed by all phases.   8M
8. a) Discuss the ACID properties with example.   7M
    b) Define these terms: Schedule, Blind write, dirty read, unrepeatable read, serializable schedule, recoverable schedule, avoids-cascading-aborts schedule.   8M

Unit – 5

9. a) Write an algorithm for deletion of node from B+ tree.   7M
    b) Consider a disk with a sector size of 512 bytes, 2000 tracks per surface, 50 Sectors per track, 5 double-sided platters, average seek time of 10 msec.   8M
    i.   What is capacity of a track in bytes? What is the capacity of each   surface? What is the capacity of the disk?
    ii. How many cylinders does the disk have?
    iii. Give examples of valid blocks sizes. Is 256 bytes a valid block size? 2048? 51200?
    iv. If the disk platter rotate at 5400 rpm (revolution per minute), what is the maximum rotational delay?
    v.   Assuming that one track of data can be transferred per revolution, what is the transfer rate?

10. a) What does it mean to say that a page is pinned in the buffer pool? Who is responsible for planning pages? Who is responsible for unpinning pages?   8M
    b) Explain what is RAID system? and how it improves performance and reliability. Discuss choice of RAID levels.   7M

VARDHAMAN COLLEGE OF ENGINEERING
(AUTONOMOUS)
Four Year B. Tech IV Semester Regular Examinations June - 2013
(Regulations: VCE-R11)
POWER SYSTEM GENERATION
(Electrical and Electronics Engineering)

Time: 3 hours   Max Marks: 75

Answer ONE question from each Unit
All Questions Carry Equal Marks
All parts of the question must be answered in one place only

Unit - 1

1. a) Mention the classification of Hydro electric power plants according to available head? Explain each one of them briefly.   9M
    b) Give the differences between Kaplan and Francis turbines.   6M

2. a) What type of turbine is best suited for high head, low pressure and high specific speed hydro electric power plants? Explain its working principle with a suitable sketch.   8M
    b) A river based hydel plant has its capacity as "firm capacity" when it operates at the peak part of the load curve, the load factor here being 15%. If the rated installed capacity of the generator, head and plant efficiency are 10 MW, 50 m and 0.8 respectively, calculate the minimum flow of river water in order to operate the plant at the base of the load curve.   7M

Unit - 2

3. a) With the help of a neat schematic layout of a typical coal fire power station, briefly describe the function of its main parts.   11M
    b) What are the advantages of using super heater in thermal power station?   4M

4. a) Describe briefly the following parts of a thermal power plant.   4M
        i. Boilers
        ii. Cooling towers
    b) Explain how coal is handled in a thermal power plant starting from delivery of coal to final consumption stage.   11M

Unit - 3

5. a) What are the classifications of Nuclear reactors? Describe briefly.   8M
    b) Describe briefly a Gas turbine plant with neat schematic diagram.   7M

6. a) Discuss the various factors to be considered while selecting the site for Nuclear power plant.   7M
    b) What is a Nuclear reactor and describe the various parts of Nuclear reactor?   8M

Unit - 4

7. a) How can Substations are classified according to the service requirements?   8M
    b) Compare outdoor and indoor substations.   7M

8. a) Explain different types of busbar arrangements with neat sketch   7M
    b) What is a substation? Name the factor that should be taken care while designing and erecting a substation.   8M

Unit - 5

9. a) A generating station has a maximum demand of 100 MW. Calculate the cost per unit generated from the following data: 5M

Capital cost	=	Rs. 200 x 10^6
Annual load factor	=	40%
Annual cost of fuel and oil	=	Rs. 15 x 10^6
Taxes, wages and salaries etc.	=	Rs. 10 x 10^6
Interest and depreciation	=	15%

 b) What is a tariff? What are the different types of tariff? Discuss.   10M

10. a) Show that the sine of most economical angle is equal to ratio of annual cost of phase advancing plant to annual tariff per KVA of maximum demand.   8M

 b) A supply system supplies the following loads: 7M
 i.   A lighting load of 500 kW at a power factor 0.7 lagging.
 ii. 400 kW at power factor 0.7071 lagging.
 iii. 800 kW at power factor 0.8 leading.
 iv. 500 kW at power factor 0.6 lagging.
 v.   Motor synchronous generator set supplies 360 kW (D.C. load) and has an efficiency of 90%.

 Calculate the power factor of the motor so that the station power factor may be unity.

VARDHAMAN COLLEGE OF ENGINEERING
(AUTONOMOUS)
Four Year B. Tech IV Semester Regular Examinations June - 2013
(Regulations: VCE-R11)
CONTROL SYSTEMS
(Common to Electronics and Communication Engineering &
Electrical and Electronics Engineering)

Time: 3 hours   **Max Marks: 75**

Answer ONE question from each Unit
All Questions Carry Equal Marks
All parts of the question must be answered in one place only

Unit - 1

1. a) From basic principle derive an expression for the transfer function between $\theta_m(S)$ and armature voltage of armature controlled DC servomotor.   7M

   b) Refer the rotational system shown in figure.1. Obtain the equations of motion for the inertias J_1, J_2 and find the transfer function $\dfrac{\theta_1(S)}{T(S)}$ 8M
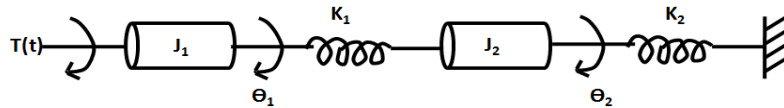
Figure.1

2. a) Define open loop and close loop control systems. Briefly describe the features and applications of closed loop control systems.   8M

   b) For the mechanical system shown in figure.2, find the transfer function $\dfrac{X_1(S)}{F(S)}$.   7M
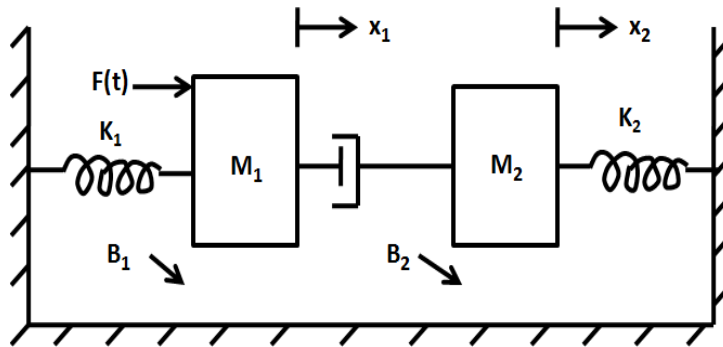
Figure.2

Unit - 2

3. a) Obtain C(s)/R(s) using block diagram reduction rules for the for the block diagram shown in figure.3.   8 M
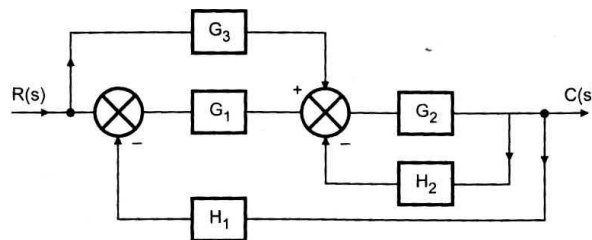

Figure.3

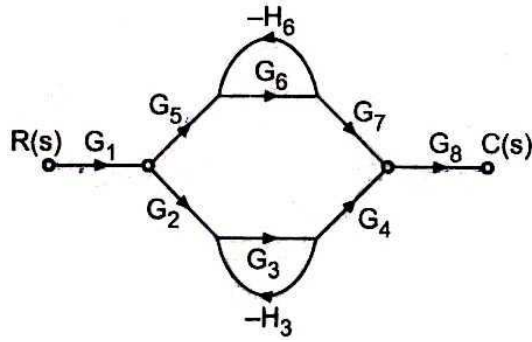b) Obtain the transfer function using Mason's gain reduction formula for figure.4 given below.   7 M

Figure.4

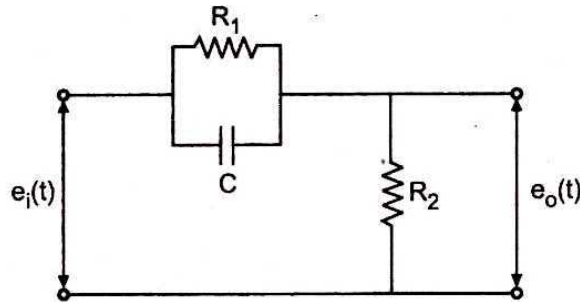4. a) Obtain the transfer function for the lead network shown in figure.5 below.   7 M

Figure.5

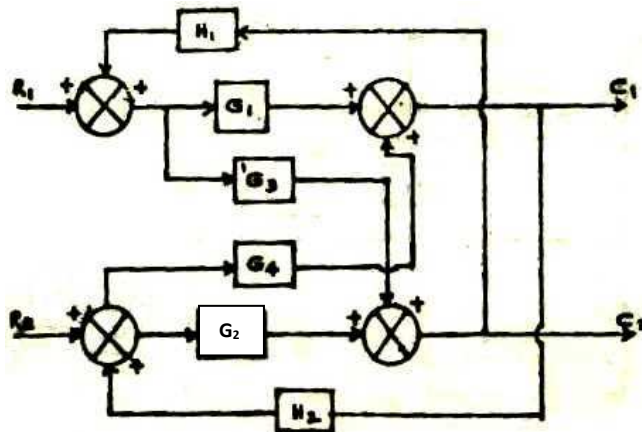b) Evaluate C_2/R_1 for the system whose block diagram representation is shown in figure.6 below.   8M

Figure.6

Unit - 3

5. a) Utilizing the equation of transient response of second order system derive an expression for peak time and rise time interms of 'ξ' and 'ω_n'.   10M

b) For a unity feedback system $G(s) = \dfrac{200}{s(s+8)}$ and r(t) = 2t determine steady state error.   5M

If it is desired to reduce this existing error by 5% find new value of gain of the system.

6.

a) Sketch the root locus for the system having $G(s)H(s) = \dfrac{(s+0.5)}{s(s^2+2s+2)}$.   10M

b) The characteristic equation of a feedback control system is   5M
$s^4 + 20Ks^3 + 5s^2 + 10s + 15 = 0$
Find the range of K for which the system is stable.

Unit - 4

7. A certain unity feedback control system is given by $G(s) = \dfrac{K}{s(1+s)(1+0.1s)}$. Draw the bode   15M
plot of the above system. Determine from the plot the value of 'K' so as to have
    i.   Gain Margin = 10 db
    ii.   Phase Margin = 50°

8. a) Find the open-loop transfer function of a system whose approximate plot is shown   8 M
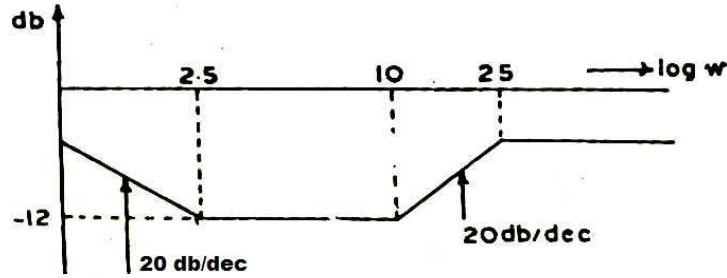in figure.7.

Figure.7

   b) Draw the complete Nyquist plot for a system whose open-loop transfer function is   7 M
$G(s)H(s) = \dfrac{K}{s(s+2)(s+10)}$. Determine the range of 'K' for which closed-loop system is
stable.

Unit - 5

9. a) Write a note on state and state variable. Also write the advantages of state space   8M
Techniques.
   b) Represent the differential equation given below in a state model   7M

$$\frac{d^3 y}{dt^3} + 3\frac{d^2 y}{dt^2} + 6\frac{dy}{dt} + 7y(t) = 2u(t)$$

10. a) Obtain the state transition matrix φ(t) of the following system: 8M

$$\begin{bmatrix} \dot{x1} \\ \dot{x2} \end{bmatrix} = \begin{bmatrix} 0 & 1 \\ -2 & -3 \end{bmatrix} \begin{bmatrix} x1 \\ x2 \end{bmatrix}$$

Also obtain the inverse of the state transition matrix φ⁻¹(t)

   b) Obtain the state model of the given transfer function   7M

$$\frac{Y(S)}{U(S)} = \frac{24}{S^3 + 9S^2 + 26S + 24}$$

VARDHAMAN COLLEGE OF ENGINEERING
(AUTONOMOUS)
Four Year B. Tech IV Semester Regular Examinations June - 2013
(Regulations: VCE-R11)
WEB TECHNOLOGIES
(Common to Computer Science and Engineering & Information Technology)

Time: 3 hours   Max Marks: 75

Answer ONE question from each Unit
All Questions Carry Equal Marks
All parts of the question must be answered in one place only

Unit - 1

1. a) Discuss about the different tiers of web application. State the most suitable web –tier for university registration system. Also support the discussion with appropriate justification.   8M

    b) Write a javascript to analyze a subject code for subject in a semester. The subject code may be visualized like 12 CS 43 where '12' represents year of syllabus, 'CS' – indicates the engineering discipline as Computer Science and Engineering and '4' gives the semester details as 4th sem, and '3' gives the subject information.   7M

2. a) Demonstrate with an case-study, the event model in DHTML.   7M

    b) Demonstrate with an example, the use of common tags in HTML. (State at-least 10 tags).   8M

Unit - 2

3. a) With suitable example, explain the different types of XML parsers.   7M

    b) Discuss the deployment structure, processing of information and protocol support for Jigsaw and Tomcat servers.   8M

4. a) Create a XML document to store the student information for Identity card with the fields like Student name, year of joining, date of birth, blood group and permanent address. Create a DTD to validate the document.   7M

    b) Create a XML document to prepare a table for student with fields like Student Name as SNAME, Student ID as SID and Total marks as TOTMARKS.   8M

Unit - 3

5. a) Write a Servlet to display a "Hello" message.Also mention the deployment structure used in IIS server to execute the program.   6M

    b) Illustrate with servlet code, to retrieve the employee records from MySQL database and display on web page. The Employee table in database has following schema –   9M

Employee Table

ENAME	SSN	DESGN	DEPT	SALARY

6. a) Explain the life cycle of servlet. Also mention the flow of events during request and response using sequence diagram.   8M

    b) With a code snippet, explain how session tracing is handled in java with servlet.   7M

Unit - 4

7. a) Make a Comparison of JSDK and Apache Tomcat.   7M

    b) Develop a JSP to detect the Web Browser.   8M

8. a) Explain the components of JSP.   8M

    b) Explain the core interface provided by javax.servlet.http.package.   7M

Unit - 5

9.   Short Notes on :   15M
     i.   CGI
     ii.   JSF
     iii.   CMS

10. a)   Using ASP, create a Registration and Authentication Application for on-line purchase   8M
          of Book. The application should have
          i.   Registration form page.
          ii.   Thank you for registration page.
          iii.   Invalid Book number.
          iv.   Authentication failed.

     b)   Write an ASP code to display the student information for Identity Card application   7M
          using HTML. Also list out the key object of ASP and their features.

VARDHAMAN COLLEGE OF ENGINEERING
(AUTONOMOUS)
Four Year B. Tech IV Semester Regular Examinations June - 2013
(Regulations: VCE-R11)
COMPUTER GRAPHICS
(Common to Computer Science and Engineering & Information Technology)

Time: 3 hours   Max Marks: 75

Answer ONE question from each Unit
All Questions Carry Equal Marks
All parts of the question must be answered in one place only

Unit - 1

1. a) List the areas where we will use computer graphics and explain in detail the importance   9M
        of graphics in
        i.   Data visualizations
        ii.   Education and training
        iii.   Computer art
    b) Compare and Contrast random scan and raster scan displays.   6M

2. a) Justify why CRT is called as Refresh CRT and explain the basic working principles of   9M
        cathode ray tube along with neat sketch describing about each component
    b) Illustrate the sequence of coordinate transformations from modeling coordinates to   6M
        device coordinates.

Unit - 2

3. a) Consider the line from (0, 0) to (4, 6). Use the simple DDA algorithm to rasterize this   7M
        line.
    b) Explain mid-point circle drawing algorithm with a neat diagram.   8M

4. a) Explain the scan line polygon filling algorithm. Also write the data structures used for   8M
        implementing the algorithm.
    b) Explain flood fill algorithm with pseudo-code.   7M

Unit - 3

5. a) Illustrate the transformation sequence for rotating an object about a specified pivot   6M
        point in 2D.
    b) Prove that multiplication of transformation matrices for each of the following   9M
        sequence of 2D transformation operation is commutative
        i.   Two successive rotations
        ii.   Two successive translations
        iii.   Two successive scaling

6. a) Illustrate the stages involved in two dimensional viewing transformation pipeline with   8M
        a neat sketch.
    b) Discuss Cohen- Sutherland line clipping algorithm.   7M

Unit - 4

7. a) Illustrate the steps for obtaining a composite matrix for rotation about an arbitrary axis   10M
        with the rotation axis projected onto the z axis in 3D (rotation with axis not parallel to
        any coordinate axis).
    b) Compare and contrast the difference between perspective projection and parallel   5M
        projection.

8. a) Demonstrate the formulation of B-spline blending functions for a uniform integer knot   7M
        vector.
    b) List all 3D transformation and explain each with corresponding transformation matrices.   8M

Unit - 5

9. a) Explain the depth sort algorithm for hidden surface removal.   8M
    b) Explain direct motion specification with a neat diagram.   7M

10. a) Explain Computer Animation Languages with suitable examples.   8M
    b) Explain back face detection algorithm for hidden surface removal.   7M

VARDHAMAN COLLEGE OF ENGINEERING
(AUTONOMOUS)
Four Year B. Tech IV Semester Regular Examinations June - 2013
(Regulations: VCE-R11)
ELECTRONIC CIRCUIT ANALYSIS
(Electronics and Communication Engineering)

Time: 3 hours   Max Marks: 75

Answer ONE question from each Unit
All Questions Carry Equal Marks
All parts of the question must be answered in one place only

Unit - 1

1. a) For the transistor amplifier shown in figure. 1, determine the dc level of I_B and V_C.   8M
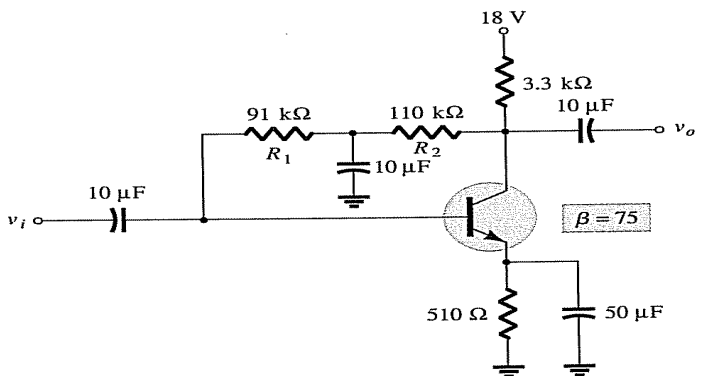
Figure.1

   b) Determine suitable values for R_1 and V_{DD} in the circuit in figure.2, to provide an   7M
   operating point of $|I_D|$ = 12 mA and $|V_{DS}|$ = 8 V, if the FET is satisfactorily described by
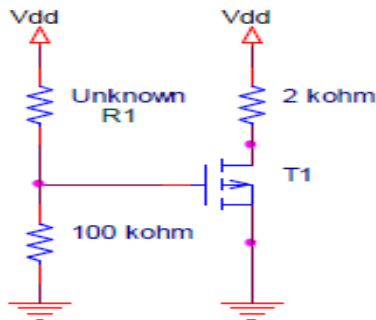   the nonlinear relationship $I_D = 4(V_{GS}+2)^2$ mA.

Figure.2

2. a) Find the Q-point for the circuit shown in figure.3, if R_1 = 120 kΩ, R_2 = 270 kΩ, R_E = 100   7M
   kΩ, R_C = 150 kΩ, β_F = 100, V_{BE} = 0.7 V, and the positive power supply voltage is 15 V.
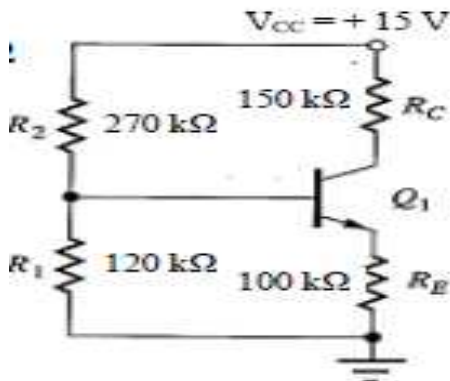

Figure.3

b) The FET in the circuit in figure.4, is characterized by $|I_{DSS}| = 22.5$ mA and $|V_P| = 3.6$ V. Determine suitable values for the external circuit elements to obtain an operating point of $|I_D| = 15$ mA and $|V_{DS}| = 6$ V   8M
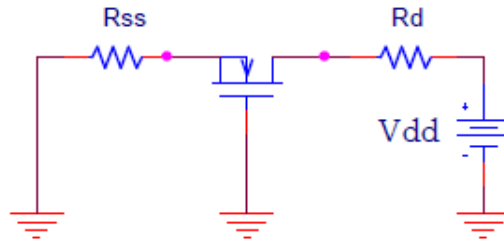

Figure.4

Unit - 2

3. a) Explain the important properties of negative feedback.   7M
   b) With the help of network topology, obtain the expressions for transfer ratio, input impedance and output impedance of voltage series feedback system.   8M

4. a) Design a RC phase shift oscillator for the following specifications using BJT.   8M
   Given $f_o = 1$KHz, $R_C = 2$KΩ, $R=1$KΩ, $V_{CC}=10$V, $I_C=2$mA and $\beta=50$. Draw the circuit and insert the values.
   b) Explain the working of Colpitts oscillator with condition for stable oscillations.   7M

Unit - 3

5. a) Explain the high frequency behavior of BJT and obtain the hybrid –Π model with usual notations.   8M
   b) What are high input impedance circuits and their characteristics? Give its classification and comparison.   7M

6. a) Explain the necessity of cascading of amplifiers and its effects on bandwidth and gain.   6M
   b) Derive the expressions for f_L, f_H and A_{vmid} for R-C coupled amplifier.   9M

Unit - 4

7. a) What is the quiescent collector current in figure.5? Also calculate the maximum efficiency of the amplifier.   7M
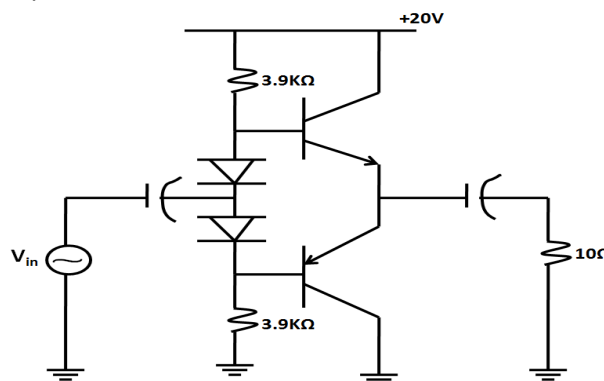

Figure.5

b) The adjustable resistor of Figure.6 sets both emitter diodes on the verge of conduction. What is the maximum transistor power dissipation? Also the maximum output power? **8M**
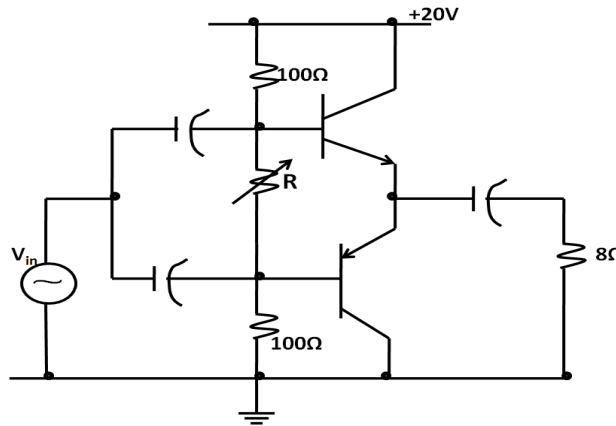

Figure.6

8. a) With a neat schematic of a Class B push pull emitter follower explain cross over distortion. **7M**

b) If the peak-to-peak output voltage is 18 V and the input impedance of the base is 100 Ω, What is the power gain in figure.7? **8M**
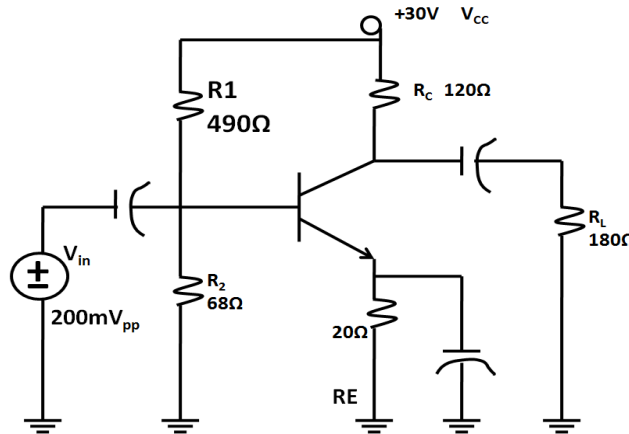

Figure.7

Unit - 5

9. a) A parallel resonant circuit has a capacitor of 250pF in one branch and inductance of 1.25mH plus a resistance of 10Ω in the parallel branch. Find **8M**
   i. Resonant frequency
   ii. Impedance of the circuit at resonance
   iii. Q factor of the circuit.

b) With the help of neat schematics explain the working of a double tuned amplifier. **7M**

10. a) A parallel resonant circuit has a capacitor of 100pF in one branch and inductance of 100μH plus a resistance of 10Ω in parallel branch. If the supply voltage is 10V, Calculate **7M**
   i. Resonant frequency
   ii. Impedance of the circuit at resonance

b) With the help of neat schematics explain the working of a single tuned amplifier. **8M**

VARDHAMAN COLLEGE OF ENGINEERING
(AUTONOMOUS)
Four Year B. Tech IV Semester Regular Examinations June - 2013
(Regulations: VCE-R11)
PULSE AND DIGITAL CIRCUITS
(Electronics and Communication Engineering)

Time: 3 hours   **Max Marks: 75**

Answer ONE question from each Unit
All Questions Carry Equal Marks
All parts of the question must be answered in one place only

Unit - 1

1. a) Explain and obtain the response of RC low pass circuit to a step input. Draw the input and output waveforms. **8M**

   b) The pulse from a high voltage generator rises linearly for 0.05μsecs and remains constant for 1μsec. The rate of rise of pulse is measured with RC differentiator circuit whose time constant is equal to 250 psecs. If the positive output voltage from the differentiator has a maximum value of 50V, what is the peak voltage value of generator? **7M**

2. a) In an attenuator circuit $R_1=R_2=1M\Omega$, capacitor across R_2 is $C_2=50\mu F$, input is a step voltage of 20V, compute and draw to scale the output waveform for capacitor C_1 across the resistor R_1 for the following three cases: **8M**

      i.   C=50PF
      ii. C=75PF
      iii. C=25PF

   b) Obtain the response of High pass circuit to a sinusoidal input. Also obtain the relation between the lower cut-off frequency and time constant. **7M**

Unit - 2

3. a) Draw the transfer characteristic for the clipper circuit shown in figure.1. Find the value of input voltage at which the output will be zero. Also find at what values of input voltage D_2 conducts. **8M**
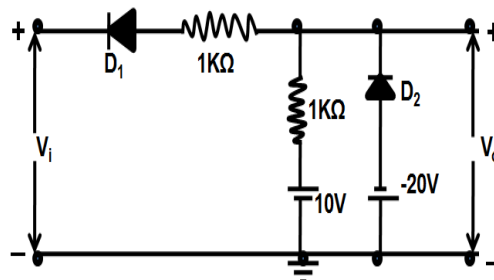

Figure.1

   b) Calculate the output levels of the circuit shown in figure.2 for inputs of 0V and -8V and verify that the circuit is an inverter. What is the minimum value of h_{FE} required? Neglect junction saturation voltages and assume the diode is ideal. **7M**
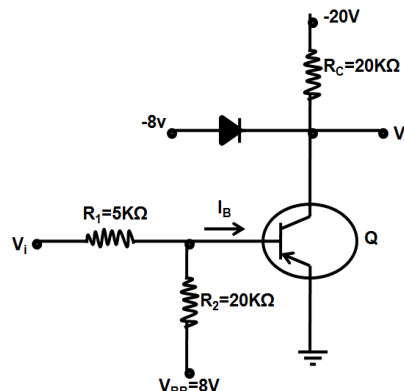

Figure.2

4. a) Calculate the steady state output voltage level and plot the waveform when a square   8M
        wave input signal with a peak-to-peak value of 15V is applied to clamping circuit. The
        input base level is zero level.   The frequency of the input signal is 5kHz, C=0.1µF,
        R=20kΩ, R_f=1kΩ, R_r=500kΩ. Assume T1=T2
    b) Draw the transfer characteristics for the clipper circuit shown in figure.3. Assume ideal   7M
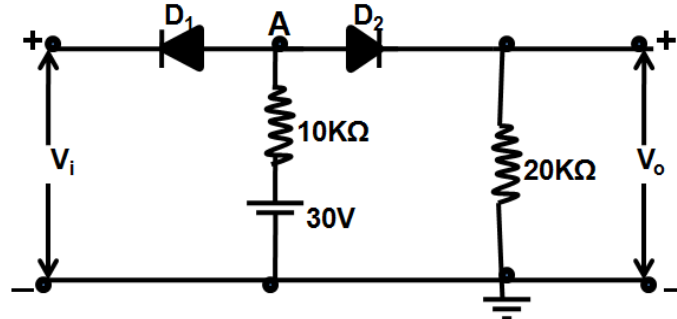   diodes.

Figure.3

Unit - 3

5. a) Describe a bi-stable multivibrator. What do you mean by triggering? With the help of   8M
        neat diagrams discuss the different methods of triggering a binary.
    b) Design a collector coupled one shot with a gate width of 3ms. Using n-p-n transistors   7M
        with h_{fe}=20, neglect I_{CBO}, $V_{BE(sat)}$ and $V_{CE(sat)}$. Let V_{CC}=6V and $I_{C(sat)}$=2mA, $V_{BE(OFF)}$=-1V.

6. a) What is Schmitt trigger? Explain any three applications of Schmitt trigger. With the help   8M
        of a neat circuit diagram and waveforms explain the working principle of Schmitt trigger.
    b) Design a free running multivibrator to generate a square wave of amplitude 10V and   7M
        frequency 1kHz with 70% duty cycle.   Consider n-p-n transistors with h_{fe}=25,
        $V_{BE(sat)}$=0.7V, $V_{CE(sat)}$=0.3V, $I_{C(sat)}$=5mA.

Unit - 4

7. a) Mention the different types of sweep circuit. With neat circuit and waveform explain   7M
        the working principle of Miller Sweep circuit.
    b) Draw the circuit of Bootstrap Sweep. Design the circuit for the following Specifications: 8M
        Vcc=12V, Ic=1mA, hfe(min)=20, V_{CE}(sat)=0.3V, V_{BE}(sat)=0.7V, assume sweep time Ts=5
        mSecs.

8. a) Derive an expression for Sweep speed error (es) in Bootstrap sweep.   7M
    b) Design Miller's Sweep circuit for the following specifications: Vcc=12V, ic=1mA,   8M
        hfemin=20, VCE(sat)=0.3V, VBE(sat)=0.7V, assume sweep period Ts=5 msecs.

Unit - 5

9. a) With neat circuit diagram explain DTL Nand Gate.   8M
    b) Explain how to reduce pedestal in a Gate circuit.   7M

10. a) Realize negative logic AND gate using diodes. Compare the logic families in terms of   8M
        power dissipation and propagation delay.
    b) Explain the operation of unidirectional diode gate adapted for more than one signal   7M
        input.

VARDHAMAN COLLEGE OF ENGINEERING
(AUTONOMOUS)
Four Year B. Tech IV Semester Regular Examinations June - 2013
(Regulations: VCE-R11)
ELECTROMAGNETIC THEOREY AND TRANSMISSION LINES
(Electronics and Communication Engineering)

Time: 3 hours   Max Marks: 75

Answer ONE question from each Unit
All Questions Carry Equal Marks
All parts of the question must be answered in one place only

Unit - 1

1. a) State Coulomb's Law and obtain an expression for the same in vector form.   7M

   b) In freespace let Q_1 =10nC be at A (0,-4,0) and Q_2 = 20nC be at B (0,0,4).   8M
      i)   Find the electric field intensity E at the origin.
      ii)   Where should a 30nC point charge be located so that E=0 at the origin?

2. a) Explain the term Electric Field Intensity E and derive an expression in spherical co-   8M
      ordinates. Extrapolating find E at a point r when n charges $Q_1, Q_1 Q_2... Q_n$ are located at
      $r_1, r_2,... r_n$.

   b) A point charge Q_1= 10μC is located at A(1,2,3) in free space while Q_2= -5μC is at   7M
      B(1,2,10). Find the
         i)   Vector force exerted on Q_2 by Q_1 and
         ii) Co-ordinates of P(1,2,z) at which a point charge Q experiences no force.

Unit - 2

3. a) Apply Ampere's law and determine the magnetic field intensity both inside and outside   6M
      the conductor of radius 4m, carrying a uniform current of 10A.

   b) The magnetic field intensity is given in a certain region of space as   9M
      $H = \dfrac{(x+2y)}{Z^2} \hat{a}_y + \dfrac{2}{Z} \hat{a}_z \ A/m$ find (i) J (ii) Total current passing through the surface

      $Z = 4, 1 < x < 2, 3 < y < 5$ in $\hat{a}_z$ direction.

4. a) Show that energy in a magneto static field is given by $W_m = \dfrac{1}{2}\int B_1 H \ dV$.   6M

   b) In cylindrical co-ordinates, Vector magnetic potential $\vec{A} = 100r^2\hat{a}_z \ wb/m$ is given in a   4M
      free space. Find Magnetic field intensity and flux density.

   c) The point charge Q=18nC has a velocity $5x10^6$ m/s in the direction given by   5M
      $0.04a_x - 0.05a_y + 0.2a_z$. Calculate the magnitude of the force exerted on the charge
      by the magnetic field $B = -3a_x + 4a_y + 6a_z \ m-wb/m^2$.

Unit - 3

5. a) State Maxwell's equations for static field. Explain how they are modified for time   10M
      varying electric and magnetic fields.

   b) For a lossy dielectric $\sigma = 5 \ / m$ and $\varepsilon_r = 1$. The electric field intensity is given by   5M

      $E = 100\sin 10^{10}t$. Find
         i)   Conduction current density J_c
         ii) Displacement current density J_D
         iii) Frequency at which both have equal magnitudes.

6. a) Explain and derive the boundary conditions for a dielectric- dielectric interface in electro static fields. **8M**

   b) Z=0 plane separates two lossless dielectric regions with ε_{r1} =2 and ε_{r2} =3. If we know that electric field E_1 in the region of ε_{r1} is $2ya_x - 3xa_y + (5+z)a_z \ V/m$, what do we know about E_2 and D_2 in region of ε_{r2}. **7M**

Unit - 4

7. a) An E field in free space is given as E= $800\cos(10^8 t - \beta y)a_z$ V/m. Find β, λ and H at P(0.1,1.5,0.4) at t=8ns. **5M**

   b) Discuss Poynting Theorem and obtain an expression for power flow associated with electromagnetic wave. **10M**

8. a) An uniform plane wave operating in a perfect dielectric at a frequency of 250 MHz has E = $(1000a_x + 400 \ a_y)e^{-j10y}$. If the maximum value of H is 3A/m, find β,λ,η(impedance),v(velocity of propagation),ε_r and μ_r **8M**

   b) Obtain the expressions for α, β, and skin depth δ for an electromagnetic wave propagating in good conductors. **7M**

Unit - 5

9. a) Define Reflection Co-efficient and VSWR of a transmission line loaded with an impedance of z_l and obtain an expression for the same in terms of z_0 and z_l **7M**

   b) A line with characteristic impedance of 50 ohms is connected to a load impedance of z_l = 50+j50 ohms. If the wavelength λ = 5 cm find the first V_{max}, first V_{min}, Reflection co-efficient Γ and VSWR ρ . **8M**

10. a) A transmission line has the following parameters: R= 2 ohm/m , G= 0.5 mmho/m, L= 8nH/m C= 0.23 pF. If the operating frequency is .0 GHz find the characteristic impedance of the line , propagation constant, attenuation and phase constant. **5M**

   b) An antenna with an impedance of 0.3+j0.5Ω is to be matched to a 50Ω lossless line with a shorted stub. Find the stub length, stub admittace, and the distance of stub from the load. **10M**

VARDHAMAN COLLEGE OF ENGINEERING
(AUTONOMOUS)
Four Year B. Tech IV Semester Regular Examinations June - 2013
(Regulations: VCE-R11)
ELECTRICAL TECHNOLOGY
(Common to Civil Engineering, Mechanical Engineering and Aeronautical Engineering)

Time: 3 hours

Max Marks: 75

Answer ONE question from each Unit
All Questions Carry Equal Marks
All parts of the question must be answered in one place only

Unit - 1

1. a) With neat diagram give the classification of DC machines according to method of their excitation.   8M

   b) A dc shunt generator supplies a load of 10KW at 220V through, and the resistance of armature and shunt field windings is 0.05Ω and 100Ω respectively. Calculate   7M
      i.   Load current
      ii. Shunt field current
      iii. Generated emf

2. a) Explain various losses and power flow in a dc motor.   8M

   b) A 500V dc shunt motor running at 700rpm takes an armature current of 50A. Armature resistance is 0.4Ω. What resistance must be placed in series with armature to reduce the speed to 600rmp, the torque and flux remains constant.   7M

Unit - 2

3. a) Consider a 20KVA, 2200/220V, 50Hz transformer. The OC/SC test results are as follows: 8M
   OC test: 220V, 4.2A, 148W (lv side)
   SC test: 86V, 10.5A, 360W (hv side)
   Determine the regulation at 0.8p.f lagging and at full load. What is the p.f on short circuit?

   b) Explain the various losses occurring in a single phase transformer.   6M

   c) Find the ratio of current in the primary to that in the secondary of a transformer which steps up the voltage by a factor 100.   1M

4. a) A single phase transformer has 180 and 90 turns respectively in its secondary and primary windings. The respective resistances are 0.233Ω and 0.067Ω. Calculate the equivalent resistance of   5M
      i)   Primary referred to secondary
      ii) Secondary referred to primary
      iii) Total resistance referred to primary

   b) A 600KVA, single phase transformer has an efficiency of 92% both at full load and half load at unity power factor. Determine its efficiency at 60% of full load at 0.8p.f lag.   10M

Unit - 3

5. a) List few advantages and disadvantages of squirrel cage induction motor.   7M
    b) The power input to the rotor of a three-phase, 50Hz, 6-pole induction motor is   8M
        80KW. The rotor emf frequency is1.66Hz. Find
        i) Slip
        ii) Motor speed
        iii) Mechanical power developed
        iv) Rotor copper loss per phase

6. a) With a neat diagram explain induction motor starting method using star-delta   7M
        connection.
    b) A three-phase, 4 pole, 50Hz, star connected induction motor is connected to a 400V   8M
        supply. The rotor resistance and leakage reactance are 0.2 Ω and 0.81 Ω
        respectively. The ratio of stator to rotor effective turns is 1.8.If the full –load slip is
        4%, Calculate
        i) Full load torque
        ii) Full load output
        iii) Maximum torque
        iv) Speed at maximum torque

Unit - 4

7. a) With sketches distinguish salient pole and non salient pole (smooth cylindrical) rotors of   7M
        an alternator.
    b) A three-phase, 50Hz,16pole generator with star connected winding has 144 slots with 10   8M
        conductors /slot. The flux/pole 24.8mwb is sinusoidally distributed. The coils are full-
        pitched. Find
        i) Speed
        ii) Line emf(given winding factor K_d=0.96)

8. a) Define the following with respect to synchronous machine   7M
        i) Regulation
        ii) Pull in torque
        iii) Power angle
    b) A star-connected, three-phase 50Hz,six pole alternator develops a voltage of   8M
        1000V(RMS) between the lines when the rotor dc field current is 3A. If this alternator is
        to generate 60Hz, find the new synchronous speed and calculate the new terminal
        voltage for the same field current.

Unit - 5

9. a) Explain the working principle and application of AC servomotors.   8M
    b) Write a short note on AC tachometers.   7M

10. a) Explain the working of a stepper motor. Also mention its applications.   8M
    b) With a neat figure explain shaded pole motor.   7M

VARDHAMAN COLLEGE OF ENGINEERING
(AUTONOMOUS)
Four Year B. Tech IV Semester Regular Examinations June - 2013
(Regulations: VCE-R11)
MANAGERIAL ECONOMICS AND FINANCIAL ANALYSIS
(Electronics and Communication Engineering)

Time: 3 hours   Max Marks: 75

Answer ONE question from each Unit
All Questions Carry Equal Marks
All parts of the question must be answered in one place only

Unit - 1

1. Mr. Devendra T. Vice President sales of '*Sun Zone Solar Systems*' has estimated the following demand function for the 100 liters solar water heater produced by them: 15M
   Q=1500-0.04P
   Where, Q=Quantity demanded of solar water heaters, P=Price of Solar water heater, Construct a demand curve assuming price Rs. 12,000, 13,000, 14,000, 15,000 and 16,000 per unit.

2. What is price elasticity of demand? What is its significance in managerial decision making?   15M

Unit - 2

3. Explain the 'Law of Variable Proportions' with suitable examples and diagrams.   15M
4. Construct a hypothetical cost schedule and bring out the cost output relationships in the short run between output and TC, TFC, TVC, AC, AFC, AVC.   15M

Unit - 3

5. What conditions are necessary before price discrimination is both possible and profitable? Why does price discrimination result in higher profits? Explain with suitable examples of price discrimination.   15M

6. a) Suppose you are a manager at a strategic business unit of an organization. Explain how the analysis of market structure contributes to business decision making.   8M
   b) If you are the owner of a small business what pricing formulas will you follow? Will they be effective? Justify your answer with examples.   7M

Unit - 4

7. Explain the features of Sole proprietorship and Partnership firm.   15M
8. A company has to make a choice between two projects namely A and B. The initial capital outlay of the two projects are Rs. 2, 70,000 and Rs. 4, 80,000 respectively for A and B. there is no scrap value at the end of the life for both the projects. The cost of capital is 16%. The annual cash inflows are as under: 15M

Year	Project A	Project B
1	Nil	1,20,000
2	60,000	1,68,000
3	2,64,000	1,92,000
4	1,68,000	2,04,000
5	1,68,000	1,80,000

You are required to calculate for each project:
   i.   Payback period
   ii. Net present value

Unit - 5

9. From the following trial balance prepare trading and profit and loss account and balance 15M
   sheet as on that date after taking into account the necessary adjustments.
   Trial balance as on 31st March 2012.

Opening stock	1,500	
Purchases	25,000	
Sales		78,000
Debtors	6,000	
Capital		20,000
Drawings	5,000	
Returns	800	1,000
Plant and Machinery	15,000	
Bills Receivables	2,500	
Land and Buildings	30,000	
Bills Payable		5,800
Salaries and Wages	12,000	
Trade expenses	7,000	
Rent	1,200	
Stationery	700	
Creditors		6,800
Interest received		1,400
Bad debts	300	
Furniture	5,500	
Cash balance	500	
	1,13,000	1,13,000

Adjustments:
   i. Closing stock as on 31st March 2012 is Rs.1,200
   ii. Accrued expenses: Wages Rs.400 and Rent Rs.50
   iii. Provision for bad debts on debtors should be maintained at 15% on debtors
   iv. Depreciate plant and machinery at 10% and 8% on land and buildings

10. The following is the balance sheet of ABC Ltd as on 31-3-2012 15M

liabilities	Rs.	Assets	Rs.
Equity capital (20,000 shares of 100 each)	20,00,000	Plant and machinery	12,50,000
		Buildings	5,00,000
		Debtors	4,50,000
Retained earnings	5,00,000	Stock	7,00,000
creditors	4,00,000	bills receivables	1,50,000
bills payable	1,50,000	pre-paid insurance	10,000
current liabilities	50,000	cash	40,000
	31,00,000		31,00,000

Statement of profit and loss for the year ended 31-3-12

Sales	50,00,000
less COGS	38,50,000
Gross profit	11,50,000
less operating expenses	7,50,000
Net profit	4,00,000
less tax @40%	1,60,000
Net profit after tax	2,40,000

Calculate: Current ratio, liquid ratio, stock turnover ratio, debtors turnover ratio, gross
profit ratio, net profit ratio and EPS.

VARDHAMAN COLLEGE OF ENGINEERING
(AUTONOMOUS)
Four Year B. Tech IV Semester Regular Examinations June - 2013
(Regulations: VCE-R11)
THEORY OF COMPUTATION
(Computer Science and Engineering)

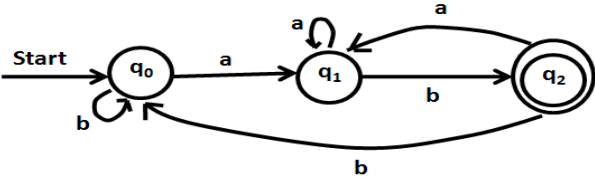Time: 3 hours   Max Marks: 75

Answer ONE question from each Unit
All Questions Carry Equal Marks
All parts of the question must be answered in one place only
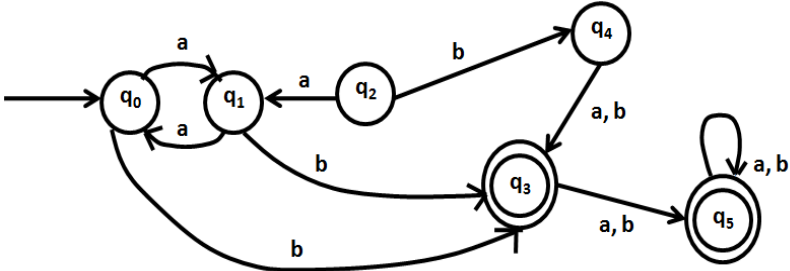
Unit - 1

1. a) Define DFA. Discuss why it study finite automata? What are the moves made by following DFA while processing the string abaab?   7M
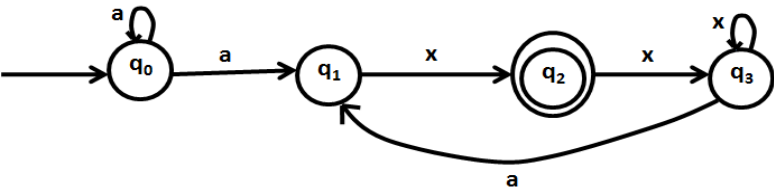

    b) Prove that if $D = (Q_D, \varepsilon, \delta_D, \{q_0\}, F_D)$ is the DFA constructed from NFA $N = (Q_N, \varepsilon, \delta_N, \{q_N\}, F_N)$ by subset construction then $L(D) = L(N)$ 8M

2. a) Minimise the following DFA   8M

    b) For the NFA given by following state transition diagram   7M
        i.   Check whether the string axxaxxa is accepted or not
        ii. Give atleast two transition paths

Unit - 2

3. a) Obtain a regular expression for L = { VUV | U,V $\in$ { a,b}* and |V| = 2 }.   7M
    b) State and prove pumping lemma for regular languages.   8M

4. a) Prove that there exists a finite automata to accept the language L(R) corresponding to the regular expression R.   7M
    b) Convert the following DFA to a regular Expression using the state elimination method (Arden's method).   8M

	0	1
→ P	S	P
Q	P	S
R	R	Q
S	Q	R

Unit - 3

5. a) Let G be the grammar   9M
$$S \rightarrow aB \mid bA$$
$$A \rightarrow a \mid aS \mid bAA$$
$$B \rightarrow b \mid bS \mid aBB$$
For the string aaabbabbba , find
(i) Leftmost Derivation.
(ii) Rightmost Derivation.
(iii) Derivation Tree.

   b) Obtain the grammar to generate strings of a's and b's having the substring ab.   6M

6. a) For the following grammar :   11M
$$S \rightarrow ABC \mid BbB, \ A \rightarrow aA \mid BaC \mid aaa, \ B \rightarrow bBb \mid a \mid D, \ C \rightarrow CA \mid AC, \ D \rightarrow \varepsilon$$
   i)   Eliminate ε-productions.
   ii) Eliminate any unit productions in the resulting grammar.
   iii) Eliminate any useless symbols in the resulting grammar.
   iv) Put the resulting grammar in Chomsky Normal Form.

   b) Write a note on applications of Context free grammars.   4M

Unit - 4

7. a) Define push down automata. Differentiate PDA by empty stack and final state by giving   6M
their definitions.

   b) Obtain PDA to accept the language L(M) = {w/wϵ(a+b)* and n_a(w) = n_b(w) by a final state   9M
i.e. number of a's in string w should be equal to number of b's in w.

8. a) Obtain a CFG that generates the language accepted by PDA M = ({q_0, q_1}, {a, b}, {A, Z}, δ,   8M
q_0, Z, {q_1}) with the transitions
$$\delta (q_0, a, Z) = (q_0, AZ)$$
$$\delta(q_0, b, A) = (q_0, AA)$$
$$\delta(q_0, a, A) = (q_1, \epsilon)$$

   b) Construct the PDA for the grammar   7M
$$S \rightarrow aABC$$
$$A \rightarrow aB \mid a$$
$$B \rightarrow bA \mid b$$
$$C \rightarrow a$$

Unit - 5

9. a) Name any three languages which are accepted by a Turing Machine.   3M

   b) Design a Turing Machine to accept the following language. L = { $0^n 1^n$ | n ≥1}   12M

10. a) Write short notes on   10M
   i.   Post correspondence problem
   ii. Undecidability of problems that are regular expression

   b) Discuss Chomsky hierarchy of languages.   5M

VARDHAMAN COLLEGE OF ENGINEERING
(AUTONOMOUS)
Four Year B. Tech IV Semester Regular Examinations June - 2013
(Regulations: VCE-R11)
ELECTRONIC CIRCUITS
(Electrical and Electronics Engineering)

**Time: 3 hours**   **Max Marks: 75**

Answer ONE question from each Unit
All Questions Carry Equal Marks
All parts of the question must be answered in one place only

Unit - 1

1. a) Draw the H parameter equivalent circuit for a typical CE amplifier and derive its parameters.   8M

    b) For the emitter follower with R_S = 0.5 kΩ and R_L = 5 kΩ, calculate A_I, A_{IS}, A_V, A_{VS}, R_O and R'_O. Assume h_{fe} = 50, h_{ie} = 1 k, h_{oe} = 25 µA/V.   7M

2. a) For the circuit shown in Fig.1 calculate: 10M

    (i) $A_i = I_O/I_i$ (ii) A_{VS} (iii) R_i and (iv) R_O.

    Assume h_{ie} = 1kΩ, h_{fe} = 100, neglect h_{re} and h_{oe}
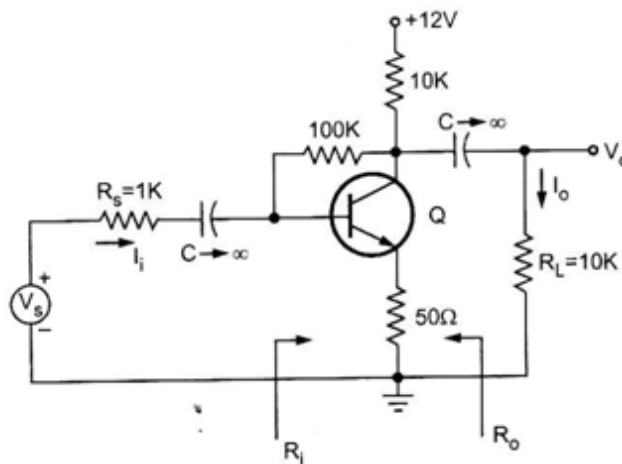
    b) Draw a source follower circuit and give its equations for: 5M
        i.   Input admittance
        ii.   Output admittance

Unit - 2

3. a) Draw the circuit diagram of transformer coupled class A power amplifier .Derive the conversion efficiency of transformer coupled class A power amplifier.   8M

    b) What is Harmonic distortion? Why do it occur in Amplifiers. Calculate the harmonic distortion components and the total harmonic distortion for an output signal having a fundamental amplitude of 3V, Second harmonic amplitude of 0.3V, third harmonic amplitude of 0.15V and fourth harmonic amplitude of 0.06V.   7M

4. a) Explain the cross-over distortion in class B amplifiers. How is this overcome in class AB push-pull amplifier.   8M

    b) Derive the maximum conversion efficiency in class B push-pull amplifier.   7M

Unit - 3

5. a) Show the effect of negative feedback on the input resistance of voltage – series   8M
       feedback amplifier.
    b) An amplifier has a bandwidth of 200 kHz and a voltage gain of 1000.   7M
       i.   What will be the new bandwidth and gain if 5% negative feedback is
             introduced?
       ii.   What is the gain bandwidth product with and without feedback?
       iii. What should be the amount of feedback if the bandwidth required is 1 MHz?

6. a) Discuss in detail what is Barkhausen criterion.   8M
    b) With a suitable circuit diagram explain the working principle of a phase shift oscillator.   7M

Unit - 4

7. a) Obtain the relation between Tilt and time constant in RC High pass circuit.   7M
    b) A symmetrical square wave whose average value is zero has peak to peak amplitude of   8M
       20V and a period of 2µSec.This waveform is applied to a low pass circuit whose upper
       3dB frequency is $1/2\pi$ MHz. Calculate and sketch the steady state output waveform.
       In particular what is peak to peak output amplitude?

8. a) State and prove clamping circuit theorem.   7M
    b) Design two level shunt clipping circut using ideal diode to clip the input sinusoidal 8M
       signal above 50V and below 25V. Draw the transfer characteristics.(forward diode
       resistance drop is 10Ω and reverse resistance is 100KΩ).

Unit - 5

9. a) Draw the circuit and waveforms at any one of the transistor's base and collector of   8M
       Astable Multivibrator. Derive an expression for period of oscillations.
    b) Design a fixed bias bistable multivibrator using npn transistor for the following   7M
       specifications: $V_{CC}=12V=V_{BB}$; $h_{fe(min)}=20$, $i_{csat}=5mA$; $V_{CEsat}=0.3V$, $V_{BE\ sat}=0.7V$.

10. a) Explain with the help of a neat circuit diagram the principle of operation of a   7M
       monostable multivibrator. Draw the waveforms at collector and bases of both
       transistor.
    b) Determine the UTP and LTP for the Schmitt trigger circuit for the following   8M
       specifications: npn silicon transistor, $h_{fe}=100$, Vcc=+12V, $R_e=2.2k\Omega$, $Rc_2=3.9k\Omega$,
       $R_{c1}=3.9k\Omega$, $R_1=22K\Omega$ and $R_2=22K\Omega$.

VARDHAMAN COLLEGE OF ENGINEERING
(AUTONOMOUS)
Four Year B. Tech IV Semester Regular Examinations June - 2013
(Regulations: VCE-R11)
AC MACHINES-I
(Electrical and Electronics Engineering)

Time: 3 hours   **Max Marks: 75**

Answer ONE question from each Unit
All Questions Carry Equal Marks
All parts of the question must be answered in one place only

Unit - 1

1. a) Derive an expression for the condition for maximum efficiency in a transformer.   5M
    b) Two 100 KW transformers each has a maximum efficiency of 98% but in one the   10M
        maximum efficiency occurs at full load while in the other it occurs at half load. Each
        transformer is on full load for 4 hours, on half-load for 6 hours and one-tenth load for
        14 hours per day. Determine the efficiency of each transformer.

2. a) Explain the principle of operation of a transformer on load.   5M
    b) The full load copper loss on the hv side of 100 KVA, 11000/317V, 1 phase transformer   10M
        is 0.62KW and on the lv side is 0.48KW. Calculate R_1, R_2 and R_2' in ohms The total
        reactance is 4 percent, find X_1, X_2 and X_2' in ohms if the reactance is divided in the same
        proportion as resistance.

Unit - 2

3. a) Is it necessary that two transformers to be operated in parallel should be of same   7M
        capacity? Discuss.
    b) A 200KVA,2000/440V,50Hz single-phase transformer gave the following test results   8M
            OC test(HV):   2KV,   1.75KW,   1.8A
            SC test(LV):   13V,   1KW,   300A
        Find
            i.   Parameters of equivalent circuit as referred to HV side
            ii.   Regulation and efficiency at full-load, 0.8p.f lagging

4. a) Draw phasor diagram and equivalent circuit of an autotransformer. Compare it with   7M
        two winding transformer.
    b) Two transformers each of 800KVA are connected in parallel. One has a resistance   8M
        and reactance of 1% and 4% respectively and the other has resistance and reactance
        of 1.5% and 6% respectively. Calculate the load shared by each transformer and the
        corresponding power factor when the total load shared is 100KVA at 0.8 p.f lagging.

Unit - 3

5. a) Enumerate the advantages of using three single phase transformers instead of one   5M
        three phase transformer of same KVA rating.
    b) Three 1100 / 110V transformers connected in Δ / Δ supply a lighting load of 100KW.   10M
        One of these transformers is damaged and hence removed for repairs. What currents
        will be flowing in each transformer when
            i.   The three transformers were in service
            ii.   The two transformers are in service

6. a) A 3ϕ step down transformer is connected to 6.6KV mains and takes 10A. The ratio of   10M
        turns per phase is 12. Neglect losses. Calculate the secondary line voltage, line current
        and output for the following connections:
            i. Δ/Δ
            ii.   Y/Y
            iii. Δ/Y
            iv.   Y/Δ
    b) List out the advantages and disadvantages of stat – star connections.   5M

Unit - 4

7. a) Discuss construction and principle of operation of a 3-phase induction motor. 7M
   b) A 6-pole, 50Hz 3-phase induction motor has rotor resistance =0.2Ω/phase. Maximum torque is 200N-m at 850 rpm . Find 8M
      i. Torque at 4% slip
      ii. Additional rotor resistance to get two-third of the maximum torque at starting . Neglect stator impedence.

8. a) Draw and explain the power flow diagram of the 3-phase induction motor .Show rotor copper loss is slip times the power input to rotor. 7M
   b) A 6 pole 3-Φ induction motor develops 30HP including mechanical losses total equal to 2 HP at a speed of 950 rpm on 550V ,50Hz mains .The power factor is 0.88. Calculate for this load 8M
      i. Slip
      ii. Rotor copper loss
      iii. Total input if the stator losses are 200 watts

Unit - 5

9. a) Discuss briefly the various methods of speed control of three –phase cage motor and wound rotor induction motor. 7M
   b) The rotor resistance and leakage reactance of a three-phase induction motor are 0.02Ω and 0.1Ω respectively. At rated voltage, the full-load slip is 5%.Determine the percentage reduction in the stator voltage to develop the full-load torque at half the full –load speed. 8M

10. a) Explain induction machine working as an induction generator. Also draw speed torque curve of induction machine showing braking, motoring and generating regions. 7M
    b) The results of no-load and blocked rotor tests on a 400V, 50HP, 50Hz, three phase,4 pole induction motor are as follows 8M
       NO-LOAD TEST: V_0=400V , I_0=30A , W_0=1800W
       BLOCKED ROTOR TEST: Vsc=110V, Isc=80A , Wsc=4000W
    The motor has a star connected stator having a resistance of 0.1 Ω /phase. Draw circle diagram and find out full load
       i. Current
       ii. Power factor
       iii. Slip
       iv. Torque
       v. Efficiency

VARDHAMAN COLLEGE OF ENGINEERING
(AUTONOMOUS)
Four Year B. Tech IV Semester Regular Examinations June - 2013
(Regulations: VCE-R11)
ELECTROMAGNETIC FIELDS
(Electrical and Electronics Engineering)

Time: 3 hours   **Max Marks: 75**

Answer ONE question from each Unit
All Questions Carry Equal Marks
All parts of the question must be answered in one place only

Unit - 1

1. a) Let a point charge Q_1 of 25nC be located at P_1(4, -2, 7) and a charge Q_2 of 60nC at P_2(-3, 4 -2). If $\epsilon=\epsilon_0$ find $\vec{E}$ at P_3(1, 2, 3). **8M**

    b) Let $V = 2xy^2z^3 + 3\ln(x^2 + 2y^2 + 3z^2)\,V$ in free space. Evaluate each of the following quantities at P(3, 2, -1) **7M**
    - i.   V
    - ii. $|V|$
    - iii. $\vec{E}$

2. a) Using Gauss's law derive the expression for the electric field intensity at a point due to an infinite sheet of charge with charge density $\rho_S C/m^2$. **7M**

    b) A charge Q_0 located at the origin in free space produces a field for which E_z=1KV/m at point P(-2,1,-1) **8M**
    - i. Find Q_0
    - ii. Find $\vec{E}$ at M(1, 6, 5)

Unit - 2

3. a) A filament is formed into a circle of radius 'a', centered at the origin in the plane z=0. It carries a current 'I' in the $\hat{a}_\phi$ direction. Find $\vec{H}$ at the origin. **5M**

    b) An infinite filament on the z-axis carries 20πmA in the $\hat{a}_z$ direction. Three uniform cylindrical current sheets are also present; 400mA/m at ρ=1cm, -250mA/m at ρ=2cm and -300mA/m at ρ=3cm. Calculate H_ϕ at ρ=3.5cm. **6M**

    c) State and explain Gauss's law for magnetic field. **4M**

4. a) Given the field $\vec{H} = 20\rho^2 \hat{a}_\phi A/m$. Determine the current density. Find the total current by a line integral around the circular path $\rho = 1, 0 < \phi < 2\pi, z = 0$. **8M**

    b) State and explain **7M**
    - i. Ampere's circuital law
    - ii. Biot-Savart's law in vector form

Unit - 3

5. a) Explain Laplace's and Poisson's equations for boundary valued problems. **5M**
    b) Derive the capacitance for a co-axial cable of inner radius 'a', outer radius 'b' and length L. **5M**
    c) Derive the continuity equation for current. **5M**

6. a) A solenoid has 400 turns with a length of 2m. It has a circular cross-section of 0.1m². Find its inductance. **5M**
    b) Derive the Neuman's formula for mutual inductance. **5M**
    c) A Toroid has a air core and has a cross sectional area of 10sq.mm. It has 1000 turns and its mean radius is 10mm. Find its inductance. **5M**

Unit - 4

7. a) Find the force per meter length between two long parallel wires separated by 10cm in air and carrying a current of 10A in the same direction.   7M

b) Explain the concept of scalar and vector magnetic potential with the help of necessary expressions.   8M

8. a) Define magnetization in terms of magnetic dipole moment.   5M

b) A point charge for which $Q = 2 \times 10^{-16} C$ and $m = 5 \times 10^{-26} kg$ is moving in the combined fields $\vec{E} = 100\hat{a}_x - 200\hat{a}_y + 300\hat{a}_z \ V/m$ and $\vec{B} = -3\hat{a}_x + 2\hat{a}_y - \hat{a}_z \ m\tau$. If the charge velocity at t=0 is $V(0) = (2\hat{a}_x - 3\hat{a}_y - 4\hat{a}_z) \times 10^5 \ m/s$, find the unit vector showing the direction in which the charge is accelerating at t=0.   10M

Unit - 5

9. a) Obtain Maxwell's equation from Faraday's law for time varying fields. Given $\vec{D} = \dfrac{-2\beta}{10^{10}} \cos(10^{10}t - \beta x)\hat{a}_y \ C/m^2$. Find the value of $\vec{B}$.   12M

b) Explain the concept of displacement current.   3M

10. a) State Maxwell's equations in point form and in integral from for time varying fields.   8M

b) State Poynting theorem. Explain different terms used. Also explain the significance of Poynting vector.   7M

VARDHAMAN COLLEGE OF ENGINEERING
(AUTONOMOUS)
Four Year B. Tech IV Semester Regular Examinations June - 2013
(Regulations: VCE-R11)
PROBABILITY AND STATISTICS
(Mechanical Engineering)

Time: 3 hours   **Max Marks: 75**

Answer ONE question from each Unit
All Questions Carry Equal Marks
All parts of the question must be answered in one place only

Unit - 1

1. a) A problem in statistics is given to three students A, B and C whose chances of solving   7M
        it are ½, ¾ and ¼ respectively. What is the probability that the problem will be solved
        if all of them try independently?

    b) The members of a consulting firm rent cars from rental agencies A, B and C as 60%,   8M
        30% and 10% respectively. If 9%, 20% and 6% of cars from A, B and C respectively
        agencies need tune up and if a rental car delivered to the firm does not need tune up,
        what is the probability that it came from B agency?

2. a) A random variable X has the following probability distribution   8M

x:	-2	-1	0	1	2	3
P(x)	0.1	k	0.2	2k	0.3	3k

   Then
   - i.   Find k
   - ii.   Evaluate P(x<2)
   - iii. P(-1<x≤2)
   - iv.   Evaluate mean of x

    b) A and B alternately throw a pair of dice. A wins if he throws 6 before B throws 7 and   7M
        B wins if he throws 7 before A throws 6 of A begins, show that hi chance of winning is
        30/61

Unit - 2

3. a) In a sample of 1000 cases, the mean of a certain test is 14 and standard deviation is 2.5.   8M
        Assuming the distribution to be normal, find
   - i.   How many students score between 12 and 15?
   - ii.   How many score above 18?
   - iii. How many score below 8?
   - iv.   How many score 16?

    b) A coin is biased so that a head is twice as likely to appear as a tail. If the coin is tossed 6   7M
        times, find the probabilities of getting
   - i.   Exactly 2 heads
   - ii.   At least 3 heads
   - iii. At most 4 heads

4. a) A population consists of five members 2, 3, 6, 8, 11. Consider all possible samples of   9M
        size 2 which can be drawn with replacement from this population.
        Find
   - i.   The mean and Standard deviation of the population
   - ii.   The mean and standard deviation of sampling distributions of means
   - iii. Considering samples without replacement, find the mean and S.D of sampling
           distribution of means.

b) In a component manufacturing industry there is a small probability of 1/500 for any component to be defective. The components are supplied in packets of10. Use Poisson distribution to calculate the approximate number of pockets containing **6M**
    i. At least one defective
    ii. At most one defective
In a consignment of 1000 packets.

Unit - 3

5. a) A die was thrown 9000 times and a throw of 5 or 6 was obtained 3240 times. On the assumption of random throwing, do the data indicate an unbiased die? **7M**

b) In a city A 20% of a random sample of 900 school boys had a certain slight physical defect. In another city B 18.5% of a random sample of `1600 school boys had the same defect. Is the difference between the proportions significant? **8M**

6. a) The nine items of a sample have the following values: 45, 47, 50, 52, 48, 47, 49, 53 and 51. Does the mean of these differ significantly from the assured mean of 47.5 **7M**

b) Explain the test of significance for means of two large samples **8M**

Unit - 4

7. a) The following data relate to marks obtained by 11 students in 2 tests, one held at the beginning of year and the other at the end of the year after intensive coaching **7M**

Test.I	19	23	16	24	17	18	20	18	21	19	20
Test.II	17	24	20	24	20	22	20	20	18	22	19

Do the data indicate that the students have benefited by coaching?

b) A machinist is expected to make engine parts with axle diameter of 1.75cm. A random sample of 10 parts shows a mean diameter 1.85cm with S.D of 0.1cm. On the basis of this sample would you say that the work of the machinist is inferior? **8M**

8. a) A survey of 320 families with 5 children revealed the following distribution **8M**

No. of boys:	0	1	2	3	4	5
No. of girls:	5	4	3	2	1	0
No. of families:	12	40	88	110	56	14

Is this result consistent with the hypothesis that male and female births are equally probable?

b) Two independent samples of sizes 8 and 7 contained the following values **7M**

Sample I:	19	17	15	21	16	18	16	14
Sample II:	15	14	15	19	15	18	16	

Is the difference between the sample means significant?

Unit - 5

9. In a machine shop the interarrival time at the tool crib are exponential with an average time of 10 min. The length of the service is exponentially distributed with a mean of 6 min. Find **15M**
    i. The probability that the person has to wait
    ii. Average queue length and average time an operator spends in the queue system
    iii. The manager of the shop will install a second booth when an arrival would have to wait 10 min or more for the service. Calculate the increase in the flow or arrivals
    iv. The probability that an arrival will have to wait for more than 10 min for service.
    v. Estimate the fraction of the day the operator is idle
    vi. The probability that there will be 6 or more operators waiting for the service

10. A box office ticket window is being manned by a single server. Customers arrive to purchase according to Poisson distribution with a mean of 30 per hour. The time required to serve the customer has an exponential distribution with a mean of 90 sec. Calculate **15M**
    i. Mean queue length
    ii. Mean line length
    iii. Mean waiting time in system
    iv. Mean waiting time in queue
    v. Probability that there are three or more customers in the sys mmtem
    vi. Percentage of time the server is busy.

VARDHAMAN COLLEGE OF ENGINEERING
(AUTONOMOUS)
Four Year B. Tech IV Semester Regular Examinations June - 2013
(Regulations: VCE-R11)
DATA COMMUNICATION SYSTEMS
(Information Technology)

Time: 3 hours   Max Marks: 75

Answer ONE question from each Unit
All Questions Carry Equal Marks
All parts of the question must be answered in one place only

Unit - 1

1. a) What does the Nyquist theorem have to do with communications? Explain in detail. 7M
   b) A signal travels from point A to point B. At point A, the signal power is 100 W. At point B, the power is 90 W. What is the attenuation in decibels? 8M

2. a) In a digital transmission, the sender clock is 0.2 percent faster than the receiver clock. How many extra bits per second does the sender send if the data rate is 1 Mbps? 5M
   b) An analog signal has a bandwidth of 20 KHz. If we sample this signal and send it through a 30 Kbps channel what is the SNRdB? 10M

Unit - 2

3. a) Draw and show the two wire parallel transmission line electrical equivalent circuit. 8M
   b) Explain wave propagation on metallic transmission lines. 7M

4. a) Explain the formula for characteristic impedance of a single coaxial cable. 8M
   b) Explain how to calculate attenuation of coaxial cable. 7M

Unit - 3

5. a) Define the characteristics of a self-synchronizing signal. 6M
   b) We have sampled a low-pass signal with a bandwidth of 200 KHz using 1024 levels of quantization. 9M
      i. Calculate the bit rate of the digitized signal.
      ii. Calculate the SNRdB for this signal.
      iii. Calculate the PCM bandwidth of this signal.

6. a) Define baseline wandering and its effect on digital transmission. 7M
   b) How many invalid (unused) code sequences can we have in 5B/6B encoding? How many in 3B/4B encoding? 8M

Unit - 4

7. a) Explain the working of synchronous data link protocols. 8M
   c) Mention the features of Asynchronous data link protocols. 7M

8. a) Determine the BCS for the following data and CRC generating polynomials. 10M
      Data G(x)= $x^7+x^5+x^4+x^2+x^1+x^0$=10110111
      CRC p(x)= $x^5+x^4+x^1+x^0$=110011
   b) Write a note on character synchronization. 5M

Unit - 5

9. a) What is dial-up modem technology? List some of the common modem standards discussed in this chapter and give their data rates.   8M

    b) What type of topology is used when customers in an area use cable modems for data transfer purposes? Explain.   7M

10. a) Distinguish between CM and CMTS.   6M

    b) Calculate the minimum time required to download one million bytes of information using each of the following technologies: 9M

      i. V32 modem

      ii. V32bis modem

      iii. V90 modem

VARDHAMAN COLLEGE OF ENGINEERING
(AUTONOMOUS)
Four Year B. Tech IV Semester Regular Examinations June - 2013
(Regulations: VCE-R11)
PRODUCTION TECHNOLOGY
(Mechanical Engineering)

Time: 3 hours   Max Marks: 75

Answer ONE question from each Unit
All Questions Carry Equal Marks
All parts of the question must be answered in one place only

Unit - 1

1. a) What is a pattern allowance? List and explain the various types of pattern allowances.   6M
   b) It is desired to produce large castings of circular and symmetric shapes. Suggest which type of pattern is most suitable to produce such a mould cavity. Sketch and explain it.   4M
   c) Differentiate between open and blind risers.   5M

2. a) With the help of a cooling curve explain equilibrium cooling and super cooling during solidification of a pure metal.   8M
   b) With suitable sketches explain the various steps involved in the lost wax casting process.   7M

Unit - 2

3. a) Explain the principle of arc welding process.   5M
   b) What are the electrodes in arc welding made up of? What are electrode coatings and why are they provided?   4M
   c) Explain the features of neutral flame, reducing flame and oxidizing flame.   6M

4. a) What do you mean by welding and why it is done?   3M
   b) What do you understand by the term polarity in electric arc welding? What is the advantage of having different polarities?   4M
   c) With the help of a neat sketch explain the process of plasma arc welding? List its advantages, disadvantages and applications.   8M

Unit – 3

5. a) Sketch and describe TIG welding process. List the advantages of the same.   7M
   b) Describe with a neat sketch a welding process to weld pipe / solid round rods.(carbon Steel or stainless steel).   8M

6. a) Define "Defect". List any four defects observed in welding, and suggest remedies for the same.   6M
   b) Describe clearly (i) Recovery   (ii) Recrystallization.   6M
   c) Compare the properties of cold and hot worked products.   3M

Unit - 4

7. a) Define Rolling. List the 4 different methods of reducing roll forces.   6M
    b) What are residual stresses? Discuss the same with respect to rolling process.   6M
    c) Sketch cluster roll mill   3M

8. a) Define the following with neat simple sketches   6M
        i.   Bending
        ii. Forming
        iii. Drawing

    b) Design a die set for the cup shaped component having the following dimensions   9M
        Material yield stress is 280 N/mm^2
        Thickness is 2mm.
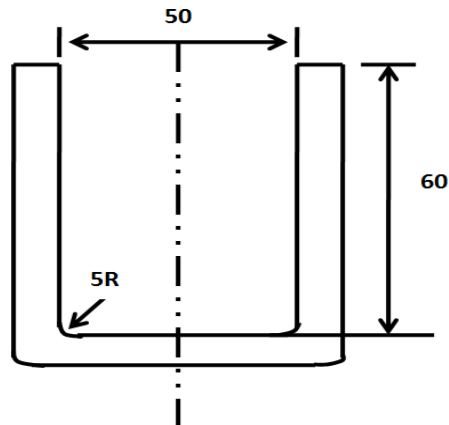
Unit - 5

9. a) Highlight the advantage of hot extrusion process. Discuss the drawbacks of the   7M
        Same.
    b) Write a brief note on extrusion defects.   8M

10. a) List any 6 advantages of using plastic materials.   6M
    b) Discuss the (variation of stress Vs. strain), the general terminology describing the   9M
        behavior of three types of plastics.

VARDHAMAN COLLEGE OF ENGINEERING
(AUTONOMOUS)
Four Year B. Tech IV Semester Regular Examinations June - 2013
(Regulations: VCE-R11)
HYDRAULIC MACHINERY AND SYSTEMS
(Mechanical Engineering)

Time: 3 hours   **Max Marks: 75**

Answer ONE question from each Unit
All Questions Carry Equal Marks
All parts of the question must be answered in one place only

Unit - 1

1. a) A 7.5 cm diameter jet having a velocity of 30m/s strikes a flat plate, the normal of which is inclined at 45^0 to the axis of the jet. Find the normal pressure on the plate   10M
   i. When the plate is stationary
   ii. When the plate is moving with a velocity of 15m/s and away from the jet. Also determine the power and efficiency of the jet when the plate is moving.
   b) The head of water from the center of the orifice which is fitted to one side of the tank is maintained at 2m of water. The tank is not allowed to move and the diameter of the orifice is 100mm. Find the force exerted by the jet of water on the tank.   5M

2. a) Write short notes on jet propulsion of ships.   5M
   b) A small ship is fitted with jets of total area $0.65m^2$. The velocity through the jet is 9m/s and speed of the ship is 18kmphr in sea water. The efficiencies of the engine and pump are 85% and 65% respectively. If the water is taken amid ships determine the propelling force and the overall efficiency, assuming the pipe losses to be 10% of the kinetic energy of the jets.   10M

Unit - 2

3. a) Define the following terms   4M
   i. Gross Head
   ii. Net Head
   b) Draw a neat sketch and explain the construction and working of any radial flow reaction turbine.   11M

4. a) Derive an equation for the work done of a Pelton wheel.   9M
   b) A Pelton wheel has a mean bucket speed of 10m/sec with a jet of water flowing at the rate of 700 lts/sec under a head of 30m. The buckets deflect the jet through an angle of 160^0. Calculate the power given by water to the runner and the hydraulic efficiency of the turbine. Assume coefficient of velocity as 0.98.   6M

Unit - 3

5. a) Define specific speed of hydraulic turbines. Derive an expression for the same. What is its utility?   7M
   b) A Kaplan turbine develops 24647.6 kW power at an average head of 39 m. Assuming a speed ratio of 2, flow ratio of 0.6, (internal) diameter of the boss equal to 0.35 times the (external) diameter of the runner and an overall efficiency of 90%, calculate the diameter, speed and specific speed of the turbine.   8M

6. a) Derive an expression for acceleration head on the flow in case of a reciprocating pump assuming simple harmonic motion of the piston.　　7M

   b) The piston of a double acting reciprocating pump has 100 mm diameter and a stroke of 250mm. The pump has a vertical suction pipe 5m long and 100mm diameter. The pump runs at 90 double strokes per minute with simple harmonic motion. Calculate the maximum permissible suction lift assuming no separation at 2 m of water absolute. Assume atmospheric head as 10.2 m of water.　　8M

Unit - 4

7. a) From the fundamentals derive and equation for work done and power required by a centrifugal pump using velocity triangles.　　7M

   b) Centrifugal pump delivers 50 l/sec against a total head of 24 m when running at 1500 rpm. The velocity of flow is maintained constant at 2.4 m/sec and blades are curved back at 30° to the tangent at out let. The inner diameter is half the outer diameter. If the manometric efficiency is 80%. Determine :　　8M
      i. Blade angle at inlet
      ii. Power required to drive the pump

8. a) Explain the phenomenon of cavitation in centrifugal pump. List out the factors favouring cavitation and its ill effects.　　7M

   b) A model of a centrifugal pump absorbs, 5 kW at a speed of 1500 rpm, pumping water against a head of 6 m. The large prototype pump is required to pump water to a head of 30 m. The scale ratio diameters is 1:4. Assuming same efficiency and similarities, find the speed, power of prototype and ratio of discharge of prototype and model.　　8M

Unit - 5

9. a) Draw a neat sketch of a direct acting hydraulic lift and explain the working.　　8M
   b) Draw a neat sketch of a gear wheel pump and explain its working.　　7M

10. a) Draw a neat sketch of a hydraulic coupling and explain the working.　　9M
    b) Write a short note on air lift pump.　　6M

VARDHAMAN COLLEGE OF ENGINEERING
(AUTONOMOUS)
Four Year B. Tech IV Semester Regular Examinations June - 2013
(Regulations: VCE-R11)
KINEMATICS OF MACHINERY
(Mechanical Engineering)

Time: 3 hours   **Max Marks: 75**

Answer ONE question from each Unit
All Questions Carry Equal Marks
All parts of the question must be answered in one place only

Unit - 1

1. a) Classify kinematic pairs and explain with neat sketches.   9M
    b) How are links classified? Explain briefly each type.   6M

2. a) Explain any two inversions of a double slider crank mechanism with neat sketches.   8M
    b) What is an indicator mechanism? Explain with a neat sketch 'Watt's indicator' mechanism.   7M

Unit – 2

3. A quick return mechanism of crank and slotted lever type shaping machine is shown in Figure.1. The dimensions of various links are as follows.   15M
    O_1O_2 = 800 mm, O_1B = 300 mm, O_2D = 1300 mm and DR = 400 mm
    The crank O_1B makes an angle of 45° with the vertical and relates at 40 rpm in the CCW direction. Find:
    i.   Velocity of the Ram R, velocity of cutting tool, and
    ii. Angular velocity of link O_2D
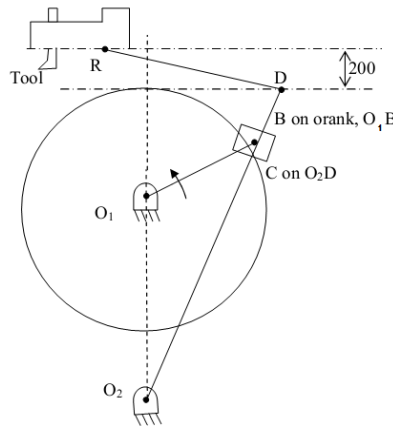
Figure.1

4. a) What is the condition for exact straight line motion?   5M
    b) A toggle mechanism is shown in figure.2 along with the diagrams of the links in mm. find the velocities of the points B and C and the angular velocities of links AB, BQ and BC. The crank rotates at 50 rpm in the clockwise direction.   10M
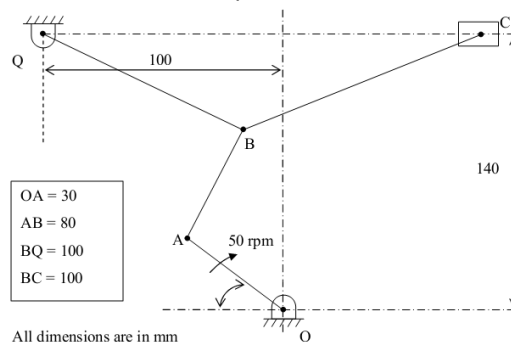

OA = 30
AB = 80
BQ = 100
BC = 100

All dimensions are in mm

Figure.2

Unit – 3

5. a) Explain Coriolis component of acceleration. 5M

b) The crank of an IC engine is 200mm long and the ratio of connecting rod to crank 10M
radius is 4. Determine the acceleration of the piston and the acceleration of point X on
the connecting rod(located at 3/4 distance from piston end) when the crank has
turned 45degree from IDC position and rotates at a uniform speed of 240 rpm
clockwise.(use klein's construction).

6. a) Locate all the instantaneous centres for a four bar mechanism shown in the figure.3. 10M
The length of the various links are AD=70mm, AB=70mm, BC=51mm and CD=80mm.
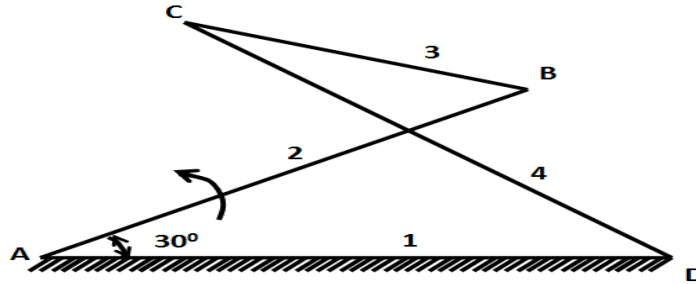
Figure.3

b) What is the condition for correct steering? Explain with a neat sketch. 5M

Unit - 4

7. a) How cams and Followers are classified? 8M

b) State and Derive Law of Gearing. 7M

8. Draw the cam profile for following conditions: Follower type = Knife edged, in-line; lift = 15M
50mm; base circle radius = 50mm; out stroke with SHM, for 60^0 cam rotation; dwell for 45^0
cam rotation; return stroke with SHM, for 90^0 cam rotation; dwell for the remaining
period. Determine maximum velocity and acceleration during out stroke and return stroke
if the cam rotates at 1000 rpm in clockwise direction.

Unit - 5

9. a) Derive the equation for centrifugal tension in belt drive. 5M

b) In a compound epicyclic gear train as shown in the figure.4, has gears A and an 10M
annular gears D & E free to rotate on the axis P. B and C is a compound gear rotate
about axis Q. Gear A rotates at 90rpm CCW and gear D rotates at 450 rpm CW. Find
the speed and direction of rotation of arm F and gear E. Gears A,B and C are having
18, 45 and 21 teeth respectively. All gears having same module and pitch.
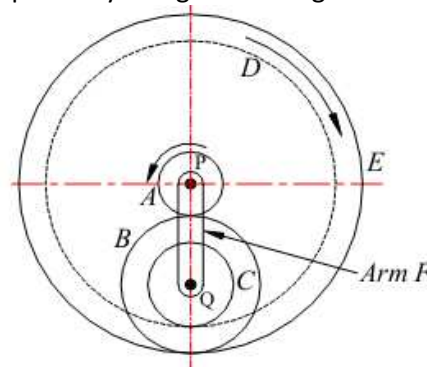

Figure.4

10. a) Which are the different types of chains used for power transmission? 5M

b) A belt is required to transmit 18.5 kW from a pulley of 1.2 m diameter running at 250 10M
rpm to another pulley which runs at 500 rpm. The distance between the centers of
pulleys is 2.7 m. The following data refer to an open belt drive, μ = 0.25. Safe
working stress for leather is 1.75 N/mm². Thickness of belt = 10mm. Determine the
width and length of belt taking centrifugal tension into account. Also find the initial
tension in the belt and absolute power that can be transmitted by this belt and the
speed at which this can be transmitted.

Hall Ticket No		Question Paper Code : AAE11T02

VARDHAMAN COLLEGE OF ENGINEERING
(AUTONOMOUS)
Four Year B. Tech IV Semester Regular Examinations June - 2013
(Regulations: VCE-R11)
AERODYNAMICS-I
(Aeronautical Engineering)

Time: 3 hours   **Max Marks: 75**

Answer ONE question from each Unit
All Questions Carry Equal Marks
All parts of the question must be answered in one place only

Unit - 1

1. a) Consider an infinitely thin flat plate of chord 'C' at an angle of attact of 12^0. The normal and axial force coefficients are 1.2 and 0.03 respectively. Calculate the lift and drag coefficients.   **3M**

   b) Explain in brief about the nomenclatures used for airfoil and 3D wing with neat sketches.   **8M**

   c) Differentiate between symmetric and cambered airfoil with appropriate 'C_L' – 'α' curves.   **4M**

2. a) What are the various forces on a typical airfoil? Obtain the expressions for aero dynamic coefficients viz. C_l, C_d, $C_{m, L.E.}$.   **10M**

   b) Write short notes on center of pressure.   **5M**

Unit - 2

3. a) Consider a velocity field where x and y components of velocity are given by   **7M**
   $u = \dfrac{cx}{x^2 + y^2}$ and $v = \dfrac{cy}{x^2 + y^2}$. Where C is constant. Obtain the expression of the stream line. Also calculate the vorticity using polar coordinates.

   b) Consider a velocity field where the radial and tangential components of velocity are $V_r=0$ and $V_\theta=CV$ respectively. Obtain the equation of the stream line. Also find the flow field is rotational or irritational.   **8M**

4. a) State vorticity and circulation. Also bring out the inter relationship between them.   **8M**

   b) Write short notes on the following: **7M**
      i. Kutta Joukowski Theorem
      ii. Kelvin Circulation Theorem

Unit - 3

5. Derive the fundamental thin airfoil relation and hence obtain an expression for lift coefficient and lift slope of a cambered airfoil.   **15M**

6. Explain briefly about the following: **15M**
      i. Kutta-Zhukowsky Transformation
      ii. Kutta condition

Unit - 4

7. a) Describe in detail about the following: **12M**
      i. Biot-Savart's law
      ii. Helmholtz theorem

   b) Consider a vortex filament of strength T in the shape of a closed circular loop of radius R. Obtain an expression for the velocity induced at the center of the loop in terms of T and R.   **3M**

8. a) A light single engine general aviation aircraft has a wing area of $14.81m^2$ and a wing   7M
    span of 9.75m. Its maximum gross weight is 1111.3kg. The wing uses an airfoil, which
    has a lift slope of 0.1033 degree^{-1} and $\alpha_L=0=-30$. Assume $\tau=0.12$, if the airplane is
    cruising at 53.64m/s with standard sea level condition and level flight. Calculate the
    geometric angle of attack of the wing. Also calculate for, e=0.64, the induced drag.

    b) Prove that for an elliptical wing loading the mid span circulation as, $\Gamma_0 = \dfrac{C_L V_S}{\pi S}$ &   8M

    $$\omega = \frac{\Gamma_0}{4S}.$$

Unit - 5

9. Derive an expression for C_P @ i^{th} control point, $C_{p,i} = \left(1 - \dfrac{V_i}{V_\infty}\right)^2$ based on the source   15M

    panel method for a non-lifting flow over arbitrary bodies.

10. For a lifting flow over arbitrary bodies obtain an expression for lift per unit span by vortex   15M
    panel method.

VARDHAMAN COLLEGE OF ENGINEERING
(AUTONOMOUS)
Four Year B. Tech IV Semester Regular Examinations June - 2013
(Regulations: VCE-R11)
AEROSPACE VEHICLE STRUCTURES-I
(Aeronautical Engineering)

Time: 3 hours   **Max Marks: 75**

Answer ONE question from each Unit
All Questions Carry Equal Marks
All parts of the question must be answered in one place only

Unit - 1

1. a) Define: 5M
        i) Limit load   ii) Proof load   iii) Ultimate load   iv) Reserve load
    b) Briefly explain the following concepts (Any 5)   10M
        i) Manoeuvring load   ii) Gust load   iii) Control loads   iv) Thermal loads
        v) Crash Loads   vi) Pressurization load

2. The following are the principle stresses σ_1=200 N/mm^2,σ_2=150 N/mm^2 ,σ_3=120N/mm^2 at a   15M
    point in a stressed material. Taking E=210KN/mm^2.Calculate the volumetric strain and
    Lame's constant .Also find strain matrix.

Unit - 2

3. a) Derive the Euler Bernoulli equation of the beam from fundamentals.   5M
    b) Draw the shear force and bending moment diagram for the beam loaded as shown in   10M
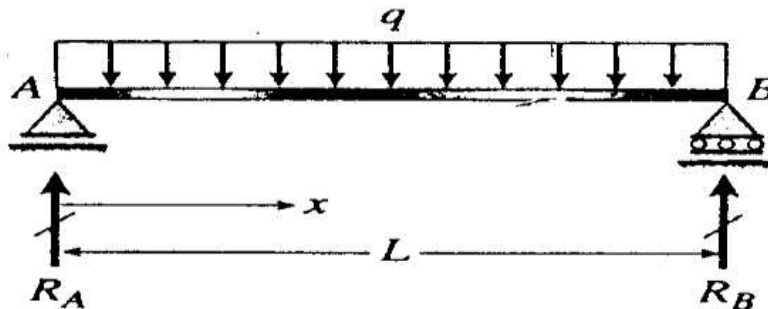   figure.1 below

Figure.1

4. a) Write a short note on the assumptions made for analysis of beams on elastic   3M
        foundation.
    b) Consider the beam on elastic foundation shown below. An alluminium alloy I-beam   12M
        (epth =100mm, Ix=2.45(106)mm4, E=72GPa) as shown in figure.2 has a length of
        L=6.6m and is supported by 7 springs (K=110N/mm) spaced at distance l=1.10m center
        to center along the beam. A load P=12.0kN is applied at the center of the beam.
        Determine the load carried by each spring, the maximum deflection of the beam, the
        maximum bending moment and the maximum bending stress in the beam
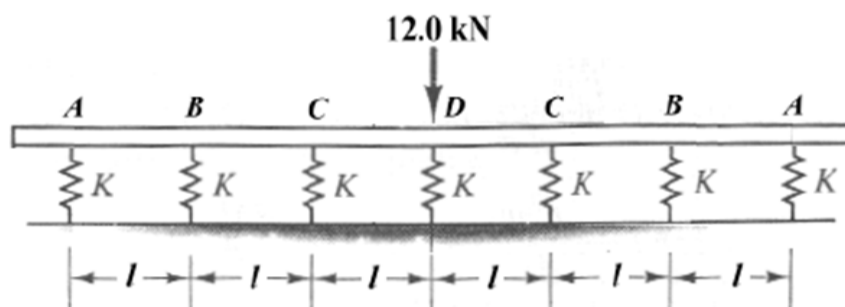

Figure.2

Unit - 3

5. a) Derive the 2-D Airy's stress function for the elasticity problems. 8M
   b) Derive the compatibility equation six components at a point in a deformable body in terms of the 3 components of displacement at that point u, v and w. 7M

6. The stresses shown in figure.3 act at a point on the free surface of a stressed body. Use Mohr's circle to determine the normal and shearing stresses at this point on the inclined plane AB as shown in the figure 15M
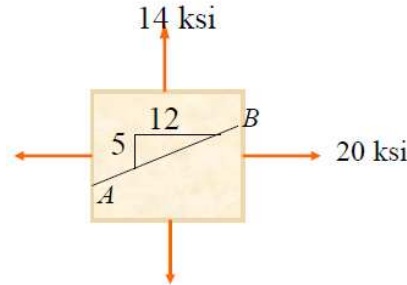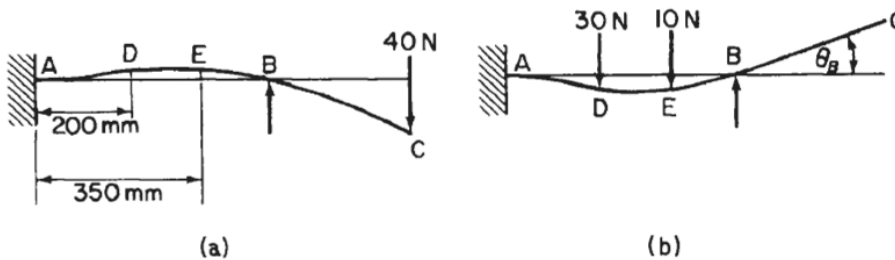

Figure.3

Unit - 4

7. a) Define Principle of Super position. 4M
   b) A cantilever 800 mm long with a prop 500mm from the wall deflects in accordance with the following observations when a point load of 40 N is applied to its end. 11M

Distance(mm)	0	100	200	300	400	500	600	700	800
Deflection(mm)	0	-0.3	-1.4	-2.5	-1.9	0	2.3	4.8	10.6

   What will be the angular rotation of the beam at the prop due to a 30N load applied from the wall, together with a 10N load applied 350mm from the wall?

(a) Given deflected shape of propped cantilever; (b) determination of the deflection of C.

Figure.4

8. a) A steel rod of uniform circular cross-section is bent as shown in figure.5 below,AB and BC being horizontal and CD vertical. The arms AB,BC and CD are of equal length .the rod is fixed at A and other end D is free .A uniformly distributed load covers the length BC. 10M
   Find the components of the displacement of the free end and D in terms of EI and GJ.
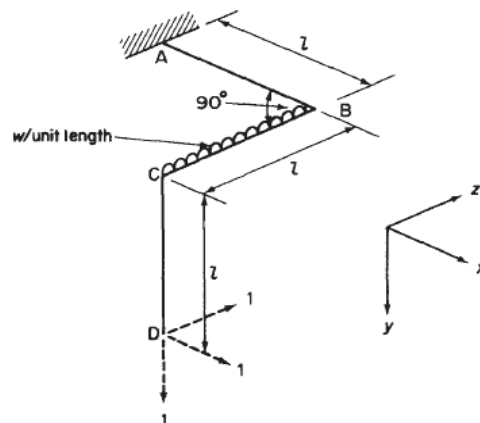

Figure.5

   b) Explain the virtual or fictitious load method using Castigliano's theorem. 5M

Cont...2

9. a) Define shear center and shear flow.   5M

    b) For the single cantilever beam figure.6 shown below, determine the shear flows in all 8   10M
        cells under shear load of V=12000 N and represent the shear flow values in the figure.
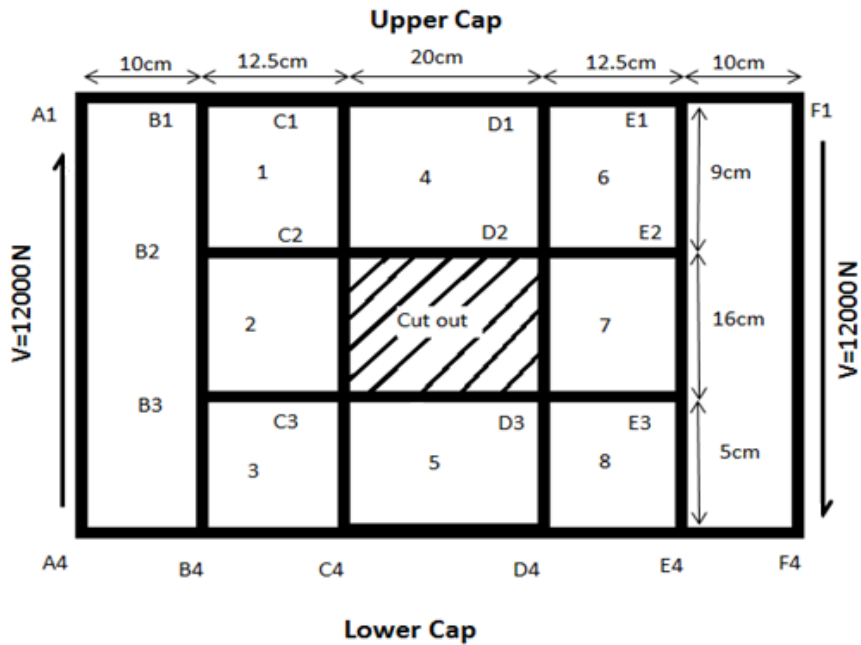

Figure.6

10. a) Explain briefly Bredt-Batho theory with neat sketch.   5M

    b) Find the Shear Flow distribution and shear center location for a beam of cross section   10M
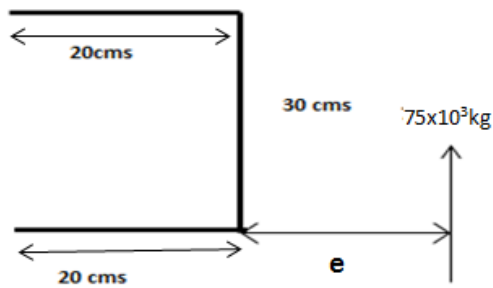   as shown in the figure.7 (Thickness=1cm)

Figure.7

VARDHAMAN COLLEGE OF ENGINEERING
(AUTONOMOUS)
Four Year B. Tech IV Semester Regular Examinations June - 2013
(Regulations: VCE-R11)
FLIGHT MECHANICS-I
(Aeronautical Engineering)

Time: 3 hours   Max Marks: 75

Answer ONE question from each Unit
All Questions Carry Equal Marks
All parts of the question must be answered in one place only

Unit - 1

1. a) Derive the pressure height relationship in the model atmosphere and draw a typical   10M
        temperature height profile of ISA.
    b) Explain the measurement of air data system of an aircraft.   5M

2. a) Obtain the relation for the measurement of airspeed and draw the graph of scale   10M
        attitude error correction.
    b) Define the following: 5M
        i.   Calibrated airspeed
        ii. Equivalent airspeed
        iii. True airspeed

Unit - 2

3. a) Explain with relevant graphs the lift dependent drag volume dependent drag and the   10M
        overall drag.
    b) Describe the minimum drag speed.   5M

4. a) Obtain the relations for range and endurance for a jet propeller aircraft.   10M
    b) Estimate the endurance for an airplane flying at sea level with a velocity of   5M
        165m/sec. The gross weight is 33142kg, usable fuel weight is 3393kg. The thrust
        specific fuel consumption of the turbofan engine is 1.917×10^{-4} s^{-1}. The other aircraft
        characteristics are as follows:
        C_{DD}=0.015, K=0.08, W=33142kgs, S=88.3m^2

Unit - 3

5. a) Draw a force diagram of an aircraft in steady climb and obtain the expression for   8M
        steady climb and also draw a hodograph diagram for climb performance and explain.
    b) An airplane powered by a turbojet engine weighs 180,000N has a wing area of 50m^2 7M
        and the drag polar is C_D=0.016+0.048CL2. At sea level a rate of climb of 1200m/min is
        obtain at a speed of 150m/sec. Calculate the rate of climb at the same when a rocket
        motor is fitted giving an additional thrust of 10,000N to the airplane.

6. a) Derive the expressions for Radius of turn and rate of turn for the following maneuvers: 9M
        i.   Level turn
        ii. Pull-up and
        iii. Pull-down
    b) Define load factor. What are its values in   6M
        i.   Level flight
        ii. Free-fall
        iii. In a turn of radius 200m at a speed of 100m/sec
        iv. At the bottom of a loop of radius 200m at a speed of 100m/sec.

Unit - 4

7. a) Explain the take-off and landing performance measurement with relevant graphs and expressions. 10M
   b) Briefly explain the parametric form of the thrust force. 5M

8. Describe on the various aspects of mission profile and fuel planning with relevant sketches. 15M

Unit - 5

9. a) Briefly explain on the aspects of certification of air worthiness of a civil aircraft. 5M
   b) Describe the operational analysis procedure of a transport aircraft. 10M

10. a) Explain the contents of the performance manual. 9M
    b) Describe the determination of the field length available for take-off for the following cases: 6M
       i.   All engines operating
       ii. One engine inoperative

VARDHAMAN COLLEGE OF ENGINEERING
(AUTONOMOUS)
Four Year B. Tech IV Semester Regular Examinations June - 2013
(Regulations: VCE-R11)
MECHANISMS AND MECHANICAL DESIGN
(Aeronautical Engineering)

Time: 3 hours   **Max Marks: 75**

**Answer ONE question from each Unit**
All Questions Carry Equal Marks
All parts of the question must be answered in one place only

Unit - 1

1. a) What is kinematic link? Briefly explain 3 types of kinematic links.   7M
   b) With neat sketch explain completely constrained motion, incompletely constrained motion and successfully constrained motion.   8M

2. a) Briefly explain any two inversions of single slider crank chain.   6M
   b) With neat sketch explain briefly Oldham's coupling and scotch yoke mechanism.   9M

Unit - 2

3. In a 4 bar mechanism, the link AB rotates at 36rad/s. The length of the links are AB=200mm, BC=400mm, CD=450mm and AD=600mm. AD is the frame. At the instant the crank is at right angles to AD find   15M
   i. Velocity of the midpoint of BC and a point on CD, 100mm from the pin connecting the links CD and AD
   ii. Angular acceleration of BC and CD

4. a) With a neat sketch explain velocity of a point on a link by relative velocity method.   5M
   b) In a four bar chain ABCD, AD is fixed and is 150 mm long. The crank AB is 40 mm long and rotates at 120 rpm clockwise , while the link CD is 80 mm oscillates about D. BC and AD are of equal lengths. Find the angular acceleration of the link CD when the angle BAD is 60°.   10M
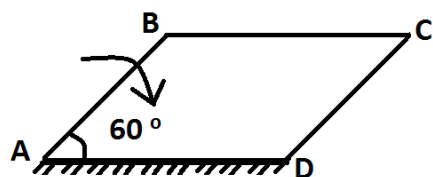
Unit - 3

5. a) State and prove Aronhold Kennedys theorem.   5M
   b) For 4 bar mechanism shown determine angular velocity of link AB and absolute velocity of point B by instantaneous center method. Also locate all the Instantaneous centers.   10M
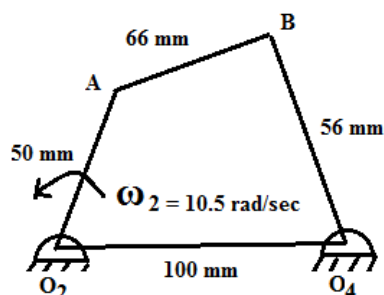
6. a) Briefly explain with neat sketch effect of gyroscopic couple on a naval ship during pitching and steering.　8M

   b) An aeroplane makes a complete half circle of 50 m radius towards left, when flying at 200 km/hr. The rotary engine and propeller of the plane has a mass of 400 kg and radius of gyration of 0.3 m. The engine rotates at 2400 rpm clockwise when viewed from rear. Find the gyroscopic couple on aircraft and state its effect on it.　7M

Unit – 4

7. Draw the profile of a cam operating a roller follower and with the following data:　15M
   Minimum radius of the cam = 20mm Lift = 30mm Roller radius 15mm
   The cam lifts the follower for 150° with SHM followed by a dwell period of 60°. Then the follower lowers down during 100° of the cam rotation with uniform velocity followed by a dwell period. If the cam rotates at a uniform speed of 120rpm,.

8. A tangent cam with straight working faces tangential to base circle of 50mm diameter has a roller follower of 20mm diameter. The line of stroke of the roller follower passes through the axis of the cam. The angle between the tangent faces of the cam is 60°. The speed of the cam is 200rpm, and the lift of the follower is 15mm. Sketch the cam and determine　15M
   a) The main dimensions of the cam
   b) The acceleration of the follower
       i. At the beginning of the lift
       ii. Where the roller touches the nose

Unit - 5

9. a) A solid shaft is required to be replaced by a hollow shaft to save 75 % of weight. If the diameter of solid shaft is 'd' and the hollow shaft are 'd_o' and 'd_i', find the relationship between diameters so as to have same torsional strength.　5M

   b) A closed coiled helical spring made of alloy steel of coil diameter 50 mm and spring index 5 to carry a load 1 KN. If the permissible deflection of the spring is 25 mm. Calculate the following　10M
       i.   Maximum stress developed in the coil
       ii. Total number of turns
       iii. Free length
       iv. Pitch of the spring. Take G = 80 Gpa

10. a) State law of gearing and derive law of gearing.　7M

    b) A fixed annular wheel A and a smaller concentric rotating wheel B are connected by a compound wheel A_1B_1, the gear A_1 mesh with wheel A and B_1 with B. The compound wheel revolves on a pin on arm R which revolves about the axis of A and B. A has 130 teeth, B has 20 teeth and B_1 has 80 teeth, the pitch of A and A_1 being twice the pitch of teeth B and B_1. How many revolutions will B make for one revolution of arm R?　8M

VARDHAMAN COLLEGE OF ENGINEERING
(AUTONOMOUS)
Four Year B. Tech IV Semester Regular Examinations June - 2013
(Regulations: VCE-R11)
THERMAL ENGINEERING-I
(Mechanical Engineering)

Time: 3 hours   Max Marks: 75

Answer ONE question from each Unit
All Questions Carry Equal Marks
All parts of the question must be answered in one place only

Unit - 1

1. a) Define internal combustion Engines ? Give classification of internal combustion engines.   9M
    b) Define the following terminology as related to internal combustion engine   6M
        i.   Bore
        ii. Stroke
        iii. Clearance volume
        iv. Displacement volume
        v.   Top dead centre
        vi. Bottom dead centre

2. a) Discuss any 4 differences between actual cycles and air standard cycles.   8M
    b) List out the advantages and disadvantages of a two-stroke cycle over a four- stroke cycle.   7M

Unit - 2

3. a) Explain briefly using pressure – crank angle diagram, the processes of normal combustion and combustion with detonation in spark ignition engines.   8M
    b) Mention the effects of knocking and explain briefly the factors affecting knocking in spark ignition engines.   7M

4. a) Explain using pressure – crank angle diagram, the various stages of combustion process in a compression ignition engines.   7M
    b) Explain briefly the Diesel knock and the rating of compression ignition engine fuels.   8M

Unit - 3

5. a) Explain willians line method for determination of friction power.   4M
    b) A six cylinder, gasoline engine operates on the four stroke cycle. The bore of each cylinder is 80 mm and the stroke is 100 mm. The clearance volume in each cylinder is 70 cc. At a speed of 4000 rpm and the fuel consumption is 20 kg/h. The torque developed is 150 N-m.   11M
        Calculate
        i.   The brake power,
        ii. The brake mean effective pressure,
        iii. Brake thermal efficiency if the calorific value of the fuel is 43000 kJ/kg and
        iv. The relative efficiency if the ideal cycle for the engine is Otto cycle.

6. a) A gasoline engine working on four- stroke develops a brake power of 20.9 kW. A Morse test was conducted on this engine and the brake power (kW) obtained when each cylinder was made inoperative by short circuiting the spark plug are 14.9, 14.3, 14.8 and 14.5 respectively. The test was conducted at constant speed. Find the indicated power, mechanical efficiency and brake mean effective pressure when all the cylinders are firing. The bore of the engine is 75mm and the stroke is 90 mm. The engine is running at 3000 rpm. 9M

   b) Write short notes on Heat Balance Sheet. 6M

Unit - 4

7. a) Derive an expression for the volumetric efficiency of a reciprocating compressor in terms of pressure ratio, clearance ratio and index of expansion. 6M

   b) An air reciprocating compressor with a bore of 15cm, stroke of 20cm and a clearance of 5% runs at 300 RPM. The suction and delivery pressures are 1 bar and 12 bar respectively. (i) Calculate the ideal volumetric efficiency and power input assuming the index of compression and expansion to be 1.3. (ii) Find also the theoretical maximum percentage saving in work possible had the compression been carried out in two stages instead of a single stage. 9M

8. a) Explain the advantages of multi-stage compression. 5M

   b) A multi-stage compressor compresses air from 1 bar to 40 bar. The maximum temperature of air is not to exceed 400K in any stage. If the compression follows the law $pv^{1.3}$ = constant, find the number of stages for minimum power input. Also find the actual intermediate pressures and temperatures. What will be the minimum power input in kW required to compress and deliver 10 kg per minute of air and the rate of heat rejection in each inter-cooler? Assume ambient temperature of 27^0C, perfect inter-cooling between the stages and specific heat of air = 1.006 kJ/kgK. 10M

Unit - 5

9. a) Explain briefly with a neat sketch, the main components and the principle of operation of a centrifugal compressor. 7M

   b) Explain briefly the head verses discharge characteristics of centrifugal compressor having backward, radial and forward curved vanes. 8M

10. a) Explain briefly with a neat sketch, the construction and principle of operation of an axial flow compressor. 9M

    b) Define the following terms applied to axial flow compressors: 6M
       (i) Static-to-stagnation efficiency
       (ii) Isentropic compression efficiency and
       (iii) Work done factor.

VARDHAMAN COLLEGE OF ENGINEERING
(AUTONOMOUS)
Four Year B. Tech IV Semester Regular Examinations June - 2013
(Regulations: VCE-R11)
AIRCRAFT PRODUCTION TECHNOLOGY
(Aeronautical Engineering)

Time: 3 hours   **Max Marks: 75**

Answer ONE question from each Unit
All Questions Carry Equal Marks
All parts of the question must be answered in one place only

Unit - 1

1. a) Describe the following sand moulds.   8M
      (i) Green sand mould,
      (ii) Core sand moulds,
      (iii) Shell moulds and
      (iv) Skin dried moulds.
   b) With a schematic diagram explain shell mould casting technique.   7M
2. a) Explain the following terms related to sand casting: 8M
      (i) Mould cavity, (ii) Pattern, (iii) Core and (iv) Riser.
   b) With a schematic sketch discuss on semi centrifugal casting technique. 7M

Unit – 2

3. a) What is the purpose of using an electrode in electric arc welding? List and explain   8M
      the various types of electrodes used.
   b) Discuss on the recent advances in welding technology.   7M

4. a) With a suitable sketch explain the construction and working principle of thermit   9M
      welding. List its advantages and disadvantages.
   b) What is brazing? Discuss the steps involved in brazing.   6M

Unit - 3

5. a) Describe with simple sketches atleast four types of machining operations that can be   8M
      done on a lathe.
   b) With a suitable sketch explain the principle of operation involved in shearing   7M
      operation. List its applications.

6. a) With the help of a schematic diagram explain the construction of a horizontal shaping   8M
      machine.
   b) With suitable sketches describe the relative characteristics of down milling and up   7M
      milling processes.

Unit - 4

7. a) With a suitable sketch explain the construction and working principle of an ultrasonic   8M
      machining process.
   b) Explain why surface treatment of manufactured products may be necessary? List and   7M
      explain any three types of mechanical surface treatment methods.

8. a) With a suitable sketch explain the construction and working principle of laser beam   8M
      machining process.
   b) What do you understand by the term thermal spraying? List and explain the various   7M
      techniques of thermal spraying.

Unit - 5

9. a) Enumerate on the main elements of jigs and fixtures. 8M
   b) Discuss the principle involved in detecting surface cracks using dye penetrate test. 7M

10. a) What are the main advantages of using jigs and fixtures in mass production. 7M
    b) Define the following terms: 8M
       (i) Quality
       (ii) Reliability
       (iii) Process capability.

VARDHAMAN COLLEGE OF ENGINEERING
(AUTONOMOUS)
Four Year B. Tech IV Semester Regular Examinations June - 2013
(Regulations: VCE-R11)
STRUCTURAL ANALYSIS-I
(Civil Engineering)

Time: 3 hours

Max Marks: 75

Answer ONE question from each Unit
**All Questions Carry Equal Marks**
All parts of the question must be answered in one place only

Unit - 1

1. a) Structurally differentiate the behavior of Cantilever beam and propped Cantilever.   5M
   b) Find the support moment for the propped Cantilever shown in Figure below and Draw   10M
   the Bending moment diagram.
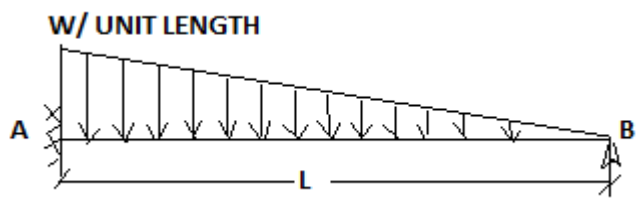
2. a) Explain briefly the consistent deformation method of analysis of Propped Cantilever.   5M
   b) For the Propped Cantilever shown in the figure below. Determine the support   10M
   reactions and   Sketch the Bending moment diagram.
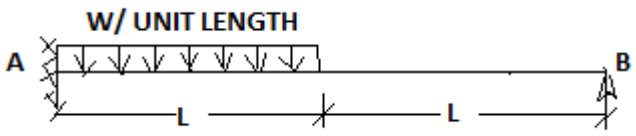
Unit - 2

3. a) Derive the expression for the deflection at the centre of fixed beam subjected to UDL   7M
      W kN/m throughout the beam.
   b) A fixed beam of 6m span is loaded with point loads of 150kN at a distance 2m from   8M
      each support. Draw BM and SF diagrams.

4. Analyse the continuous beam shown in figure below if the support B sinks by 10mm. Draw   15M
   shear force and bending moment diagram.
   Take E = 2 x 10^8 kN/m^2 and I = 8.5 x 10^5 m^4
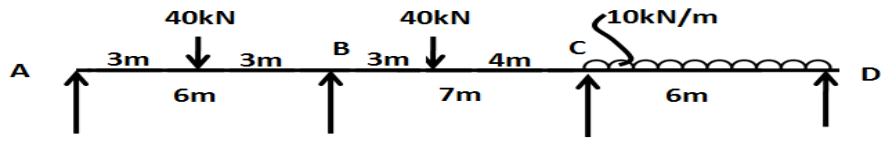
Unit - 3

5. a) Explain the load combinations involved in the analysis of moving loads on beams   7M
   b) A udl of intensity 30 kN/m of length 5 m crosses a girder of span 18 mts. Calculate   8M
      maximum Shear force and Maximum BM at a section 8 m from left support.

6. a) Define Strain Energy and derive the expression for strain energy due to Bending moment   5M

   b) Determine the deflection at point A for the frame shown in Figure below. Take $E=2.1 \times 10^5$ kN/mm^2. Members AB and AD have cross sectional area of 8000 mm^2 and member AC has an area of 4000 mm^2.   10M
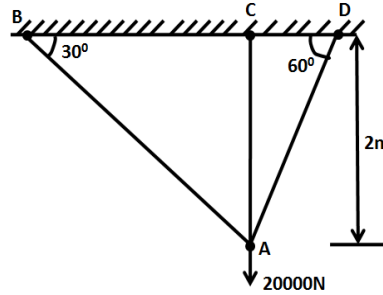

Unit - 4

7. a) Define influence line diagram. What is difference between bending moment diagram and influence line diagram?   5M

   b) Two wheel loads of 16kN and 8kN at a fixed distance apart 2m, cross a beam of 10m span. Draw the influence line for bending moment and shear force for a point 4m from the left abutment and find the maximum bending moment and shear force at that point.   10M

8. a) What is the difference between slope and deflection? Write general slope deflection equations.   5M

   b) A continuous beam ABCD consists of three spans and is loaded as shown in figure below. Determine the bending moments at the supports.   10M
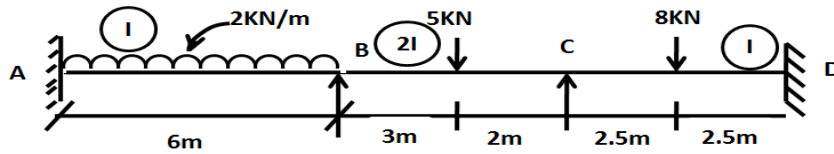

Unit - 5

9. a) Explain Static and Kinematic Indeterminancy with examples.   6M

   b) Determine the Static and Kinematic Indeterminancy for the following structures.   9M
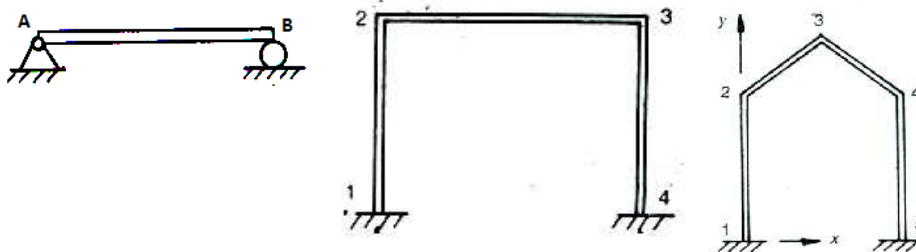
10. a) State and explain Castigliano's theorem.   5M

   b) Determine the forces in all members of the pin jointed plane frame shown in figure below using Castigliano's theorem. All the members of the frame have same of cross sectional area of 20 cm^2.   10M
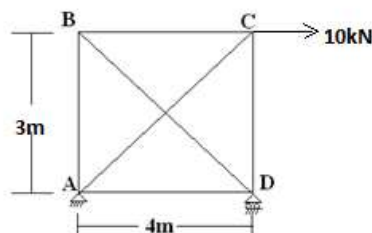
VARDHAMAN COLLEGE OF ENGINEERING
(AUTONOMOUS)
Four Year B. Tech IV Semester Regular Examinations June - 2013
(Regulations: VCE-R11)
HYDRAULICS AND HYDRAULIC MACHINES
(Civil Engineering)

Time: 3 hours   Max Marks: 75

Answer ONE question from each Unit
All Questions Carry Equal Marks
All parts of the question must be answered in one place only

Unit - 1

1. a) Derive an expression for Reynolds's number (dimensionless number).   9M
    b) A pipe of diameter 1.5m is required to transport an oil of specific gravity 0.90 and   6M
        viscosity 3×10^{-2} poise at the rate of 3000 liters/sec. Tests were conducted on a 15cm
        diameter pipe using water at 20^0C. Find the velocity and rate of flow in the model.
        Viscosity of water at 20^0C = 0.01 poise.

2. a) Derive an equation for Froude's model law in terms of scale ratio for time, scale ratio   10M
        for acceleration, scale ratio for discharge.
    b) In 1 in40 model of a spill way, the velocity and discharge are 2m/s and 2.5m^3/sec. Find   5M
        the corresponding velocity and discharge in the prototype.

Unit - 2

3. a) Derive an expression for the torque exerted on a wheel with radial curved vanes.   7M
    b) A jet of water 75mm in diameter having velocity of 20m/s strikes a series of the flat   8M
        plates arranged around the periphery of a wheel such that each plate appears
        successively before the jet. If the plates are moving at a velocity of 5m/s, compute the
        force exerted by the jet on the plate, the work done per second on the plate and the
        efficiency of the jet.

4. a) Prove that the force exerted by a jet of water on a fixed semi-circular plate in the   7M
        direction of the jet when the jet strikes at the centre of the semi-circular plate is two
        times the force exerted by the jet on the plate, the work done per second on the plate
        and the efficiency of the jet.
    b) A jet of water of diameter 50mm moving with a velocity of 25m/s impinges on a fixed   8M
        curved plate tangentially at one end at an angle of 30^0 to the horizontal. Calculate the
        resultant force of the jet on the plate if the jet is deflected through an angle of 50^0.

Unit - 3

5. a) Derive an equation of discharge through open channel by Chezy's Formula.   10M
    b) Find the slope of the bed of a rectangular channel of width 5m when depth of water is   5M
        2m and rate of flow is given as 20m^3/sec. Take Chezy's constant C = 50.

6. a) Define and derive an equation for Critical depth during Critical flow.   9M
    b) The specific energy for a 5m wide rectangular channel is to be 4Nm/N. If the rate of   6M
        flow of water through the channel is 20m^3/sec, determine the alternate depths of flow.

Unit - 4

7. a) What do you mean by gross head, net head and efficiency of a turbine? Explain the different types of the efficiency of a turbine. 7M

   b) A Pelton wheel has a mean bucket speed of 12m/s and is supplied with water at a rate of 750 litres per second under a head of 35m. If the bucket deflects the jet through an angle of 160^0, find the power developed by the turbine and its hydraulic efficiency. Take the coefficient of velocity as 0.98. Neglect the friction in the bucket. Also determine the overall efficiency of the turbine if its mechanical efficiency is 80%. 8M

8. a) Define the specific speed of a turbine. Derive an expression for the specific speed? What is the significance of the specific speed? 7M

   b) A turbine is to operate under a head of 25m at 200rpm. If the discharge is $9m^3$/s and turbine efficiency is 90%, calculate power generated by the turbine, specific speed of the turbine and performance of the turbine under a head of 20m. Also state the type of turbine. 8M

Unit - 5

9. a) Derive an expression for the minimum speed for starting a centrifugal pump. 7M

   b) A centrifugal pump delivers water against a net head of 14.5m and a design speed of 1000rpm. The vanes are curved back to an angle of 30^0 with the periphery. The impeller diameter is 300mm and outlet width 50mm. Determine the discharge of the pump if manometric efficiency is 95%. 8M

10. a) Define Cavitation. What are the effects of Cavitation? Give the necessary precautions against Cavitation. 7M

    b) A pump operates at a maximum efficiency of 82% and delivers 2.25 m^3/s under a head of 18m while running at 3600rpm speed. Compute the specific speed of the pump. Also determine the discharge, head and power input to pump at a shaft speed of 2400rpm. 8M

VARDHAMAN COLLEGE OF ENGINEERING
(AUTONOMOUS)
Four Year B. Tech IV Semester Regular Examinations June - 2013
(Regulations: VCE-R11)
SURVEYING-II
(Civil Engineering)

Time: 3 hours   Max Marks: 75

Answer ONE question from each Unit
All Questions Carry Equal Marks
All parts of the question must be answered in one place only

Unit - 1

1. a) What is local attraction, Dip and Declination in compass surveying?   7M
    b) Convert the following into reduced bearings with neat sketches: 8M
        $65^0 30'$, $140^0 20'$, $255^0 10'$, $336^0 40'$

2. a) What are the temporary adjustments of a prismatic compass?   3M
    b) The following bearings are given. Calculate in each case the angle BAC.   12M

Sl. No.	RB of AB	RB of AC
1	N 35^0 30' E	N 85^0 15' E
2	N 20^0 15; E	S 52^0 30' W
3	S 70^0 00' E	S 10^0 00'W
4	N 40^0 30' W	N 46^0 00' E
5	N 50^0 30' E	S 20^0 30' W
6	S 45^0 45' W	N 60^0 00' W

Unit - 2

3. a) State the advantages and disadvantages of plane tabling.   7M
    b) Compare the radiation and intersection methods of plane table surveying and give an 8M
        example of the most desirable application of each.

4. a) What is two-point problem? How is it solved?   7M
    b) Describe the use of various accessories of a plant table.   8M

Unit - 3

5. a) What are the various methods employed in tacheometric survey? Explain the method   7M
        most commonly used.
    b) A leveling staff is held vertical at a distances of 100m and 300m from the axis of a 8M
        tacheometer and the staff intercept for horizontal sights are 0.99m and 3.00m
        respectively. Find the constants of the instruments.
        The instrument is set up at station A and the staff is held vertical at a point B. With the
        telescope inclined at an angle of depression of 10^0 to the horizontal, the readings on the
        staff are 2.670, 1.835, 1.000m. Calculate the R.L of B and its horizontal distance from A.
        The H.I is 1.42m and R.L. is 450.5m.

6. a) Derive the distance equation for an anallactic lens. What are its advantages?   7M
    b) A tacheometer is set up at an intermediate point on a traverse course PQ and the   8M
        following observations are made on a vertically held staff:

Staff station	Vertical angle	Staff intercept	Axial hair readings
P	$+8^0$ 36'	2.350	2.105
Q	$+6^0$ 6'	2.055	1.895

Unit - 4

7. a) What are the features of total station compared to any other conventional survey instrument? 8M

   b) Explain the concept of Global positing system with a neat sketch. 7M

8. a) What are different applications of GPS? 7M

   b) Write a short note of Geographic information system. 8M

Unit - 5

9. a) What are the various angular methods commonly used for setting out a simple circular curve? Explain the field procedure of Rankine's method of deflection angle. 7M

   b) Two tangents intersect at change 59+60, the deflection angle being $50^0 30'$. Calculate the necessary data for setting out a curve of 15 chains radius to connect the two tangents if it is intended to set out the curve by offsets from chords. Take peg interval equal to 100 links, length of the chain being equal to 20m (100links). 8M

10. a) Define and give the expressions for the following elements of a simple circular curve" 7M
    - i.   Length of the curve
    - ii.   Tangent length
    - iii. Apex distance
    - iv.   Mid ordinate

    b) A compound curve, consisting of two simple circular curves of radii 350m and 500m, is to be laid out between two straights. The angle of intersection between the tangents and the two straights are 25^0 and 55^0. Calculate the various elements of compound curve. 8M

VARDHAMAN COLLEGE OF ENGINEERING
(AUTONOMOUS)
Four Year B. Tech IV Semester Regular Examinations June - 2013
(Regulations: VCE-R11)
STRENGTH OF MATERIALS-II
(Civil Engineering)

Time: 3 hours   Max Marks: 75

Answer ONE question from each Unit
All Questions Carry Equal Marks
All parts of the question must be answered in one place only

Unit - 1

1. a) A strained element in a body is subjected to two mutually perpendicular directions together with a simple shear stress. Derive expressions for principal stresses and principal planes, maximum shear stress. **8M**

    b) At a point in a bracket, the stresses on two mutually perpendicular planes are $35N/mm^2$ (tensile) and $15N/mm^2$ (tensile). The shear stress across these planes is $9N/mm^2$. Find the magnitude and direction of the resultant stress on a plane making an angle of 40^0 with the plane of first stress. Find also normal and tangential stresses on these planes. **7M**

2. a) What are different theories of failures and explain any two theories of failures? **7M**

    b) A bolt is under an axial thrust of 9.6KN together with a transverse force of 4.8KN. Determine the diameter of bolt according to **8M**
        Maximum shear stress theory
        Maximum principal stress theory
        Yield strength of material of bole – $270N/mm^2$
        Factor of safety is 3
        Poissions ratio is 0.3

Unit - 2

3. a) State Euler's Column Theory. Write the assumptions. **7M**

    b) An I-section joist 400mm x 200mm x 200mm and 6m long is used as a strut with both ends fixed. What is Euler's crippling load for the column? Take E=200GPa for joist. **8M**

4. Mention the empirical formulae for columns with equations. Find the Euler's crippling load for a hollow cylindrical steel column of 38mm external diameter and 2.5mm thick. Take length of the column as 2.3m and hinged at its both ends. Take E=205GPa. Also determine crippling load by Rankine's formula using constants as 335MPa and 1/7500. **15M**

Unit - 3

5. a) Write the assumptions in the theory of Torsion and derive the expression of Torsional stresses and strains. **7M**

    b) Find the maximum torque that can be applied safely to a shaft of 300mm dia. The permissible angle of twist is 1.5^0 in a length of 7.5m length and the shear stress is not to exceed $42N/mm^2$. Take $C=84.4KN/mm^2$. **8M**

6. a) Derive the expression for power transmitted by a solid shaft. **7M**

    b) A closed coil helical spring has mean dia of 75mm, has spring constant of 80KN/m. It has 8 coils. What is the suitable diameter of the spring wire, if maximum shear stress is not to exceed $250MN/m^2$? Modulus of rigidity of the spring wire material is $80GN/m^2$. What is the maximum axial load, the spring can carry? **8M**

Unit - 4

7. a) Define the core of a section. Derive expression for core of a hollow circular section.   7M
    b) A masonry chimney 24m high of uniform circular cross section 3.5m external diameter   8M
        and 2m internal diameter is subjected to a horizontal wind pressure of $1KN/m^2$ of
        projected area. Find the maximum and minimum intensities at the base. The specific
        weight of masonry is $22KN/m^3$

8. a) What are the stability conditions of masonry dam?   4M
    b) A masonry retaining wall trapezoidal in section with one face vertical in 1m wide at top   11M
        and 3m at the base and 8m high. The material retained on the vertical face exerts a
        lateral pressure varying from zero at top to $25KN/m^2$ at the base. IF the unit weight of
        masonry is $21KN/m^3$, calculate the maximum and minimum stress induced in the base.

Unit - 5

9. Analyse the forces in the frame shown below fig. 1 by method of joints and verify forces in   15M
    member AE, BE, BC by method of section
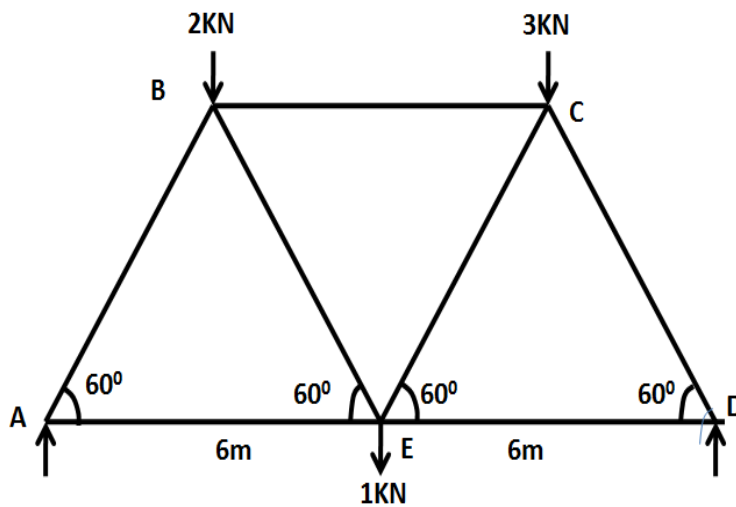

Figure. 1

10. Analyse the frame shown in figure. 2 by methods of joints and also verify forces in member   15M
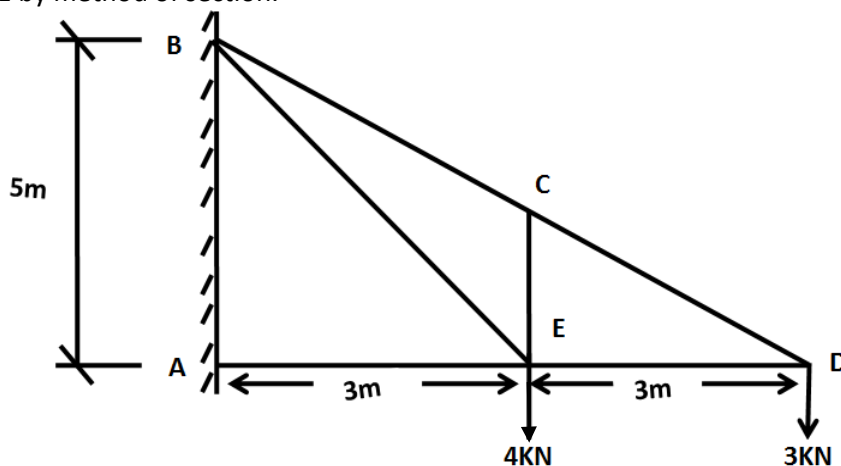   BC, BE, AE by method of section.

Figure. 2