

**VARDHAMAN COLLEGE OF ENGINEERING****(AUTONOMOUS)**

Two Year M. Tech I Semester Regular Examinations April - 2012

**(Regulations: VCE-R11)****DATA STRUCTURES AND ALGORITHMS****(Common to Computer Science and Engineering and Software Engineering)****Time: 3 hours****Max Marks: 60****Answer any FIVE Questions. All Questions carry equal marks****All parts of the questions must be answered in one place only**

- 
- 1 Consider the following arithmetic p, written in postfix notation. 12M  
P: 12, 7, 3, -, /, 2, 1, 5, +, \*, +.  
Evaluate it in Infix Expression.
- 2 a) Which of the given options provides the increasing order of asymptotic complexity of the functions:  $f_1, f_2, f_3$  and  $f_4$ ? 6M  
 $f_1(n)=2^n$      $f_2(n)=n^{3/2}$      $f_3(n)=n \log_2 n$      $f_4(n)=n^{\log_2 n}$   
b) What does the following recurrence relation evaluates to? 6M  
 $T(0)=1, T(n)=T(n-1)+3^n$
- 3 a) A complete  $n$  array tree is a tree in which each node has  $n$  children or no children. Let  $I$  be the number of internal nodes and  $L$  be the number of leaves in a complete  $n$  array tree. If  $L=41$  and  $I=10$ , then what is the value of  $n$ ? 4M  
b) What is the total number of distinct binary trees with 'n' nodes? Draw all the distinct binary trees with '5' nodes. 4M  
c) How many vertices and how many edges are there in complete bipartite graphs  $K_{4,7}$  and  $K_{7,11}$ ? If the graph  $K_{r,12}$  has 72 edges, what is  $r$ ? 4M
- 4 a) A binary search tree is generated by inserting in order of the integers: 50, 15, 62, 5, 20, 58, 91, 3, 8, 37, 60, 24. What is the total number of nodes in the left sub-tree and the right sub-tree? 4M  
b) What is the maximum height of any AVL tree with 7 nodes? Assume that the height of a tree with a single node is 0. 4M  
c) The following numbers are inserted into an empty binary search tree in the given order one by one: 15, 32, 20, 9, 3, 25, 12, 1. 4M  
i. Show the final binary search tree after the insertions.  
ii. Draw the binary search tree after deleting 15 from it.
- 5 a) What is a red black tree? Explain, in detail, its operations and applications. 6M  
b) Insert the characteristics of the string: K R P C S N Y T J M into a hash table of size 10. 6M  
Use the hand function:  $h(x) = (\text{ord}(x) - \text{ord}('a') + 1) \bmod 10$  and linear probing to resolve collisions.  
i. Which insertions cause collisions?  
ii. Obtain the final hash table.
- 6 a) Write a short notes on KNAPSACK PROBLEM. 4M  
b) Consider the following instances of the Knapsack problem:  $n=3, m=20,$  8M  
 $(p_1, p_2, p_3)=(25, 24, 15)$  and  $(w_1, w_2, w_3)=(18, 15, 10)$ . Find optimal solution.

Cont... 2

- 7 a) What is the average successful search time taken by binary search on a sorted array of 10 data items? 4M
- b) Consider a complete undirected graph with vertex set  $\{0, 1, 2, 3, 4\}$ . Entry  $W_{ij}$  in the matrix  $W$  below is the weight of the edge  $\{i, j\}$ . 8M

$$W = \begin{bmatrix} 0 & 1 & 8 & 1 & 4 \\ 1 & 0 & 12 & 4 & 9 \\ 8 & 12 & 0 & 7 & 3 \\ 1 & 4 & 7 & 0 & 2 \\ 4 & 9 & 3 & 2 & 0 \end{bmatrix}$$

- i. What is the minimum possible weight of a spanning tree  $T$  in this graph such that vertex 0 is a leaf node in the tree  $T$ ?
- ii. What is the minimum possible weight of a path  $P$  from vertex 1 to vertex 2 in this graph such that  $P$  contains at most 3 edges?
- 8 a) Prove that if  $G$  is a connected undirected graph with  $n$  vertices and  $n-1$  edges, there is a tree. 6M
- b) Explain and describe  $n$ -queens problem. 6M

**VARDHAMAN COLLEGE OF ENGINEERING**  
(AUTONOMOUS)

Two Year M. Tech I Semester Regular Examinations April - 2012  
(Regulations: VCE-R11)

**DISCRETE STRUCTURES AND AUTOMATA THEORY**  
(Computer Science and Engineering)

Time: 3 hours

Max Marks: 60

Answer any FIVE Questions. All Questions carry equal marks

All parts of the questions must be answered in one place only

- 1 a) Obtain the principle disjunctive form of  $(P \rightarrow Q) \cap (Q \leftrightarrow R)$ . 6M  
 b) Show that the following implications without construction the truth table. 6M  
 i.  $(P \rightarrow Q) \Rightarrow P \rightarrow (P \cap Q)$   
 ii.  $(Q \rightarrow (P \cap \neg P)) \rightarrow (R \rightarrow (P \cap \neg P)) \Rightarrow R \rightarrow Q$
- 2 a) Given  $A = \{x | x \text{ is an integer and } 1 \leq x \leq 5\}$ ,  $B = \{3, 4, 5, 17\}$ , and  $C = \{1, 2, 3, \dots\}$ , find  $A \cup B$  and  $A \cap B$ , and  $A \cup C$  6M  
 b) Let  $f(x) = x + 2$ ,  $g(x) = x - 2$  and  $h(x) = 3x$  for  $x \in \mathbb{R}$ , where  $\mathbb{R}$  is the set of real numbers. 6M  
 Find  $g \circ f$ ;  $f \circ g$ ;  $f \circ f$ ;  $h \circ g$ ;  $f \circ h \circ g$
- 3 a) Show that every finite semi group has an idempotent. 6M  
 b) How many words of four letters can be formed from the letters of the word INFINITE? 6M
- 4 a) Solve the recurrence relation  $T(k) = 3kT(k-1) = 0, T(0) = 1$ . 6M  
 b) Solve  $a_n - 5a_{n-1} + 6a_{n-2} = 2^n$  6M
- 5 a) Explain the differences between NFA and DFA. 6M  
 b) Design a DFA which accepts all strings which are ending with 101 over an Alphabet  $\{0, 1\}$ . 6M
- 6 a) Define Greibach Normal Form (GNF), and convert the following CFG into GNF 9M  
 $S \rightarrow AbD$        $A \rightarrow Aa / bb / ee$        $D \rightarrow Da / Db / xy / yz$   
 b) Obtain a regular grammar to obtain the even palindromes over a's and b's 3M
- 7 a) Obtain PDA to accept strings of balanced parentheses and verify by a suitable example. 6M  
 b) Convert the following grammar to CNF. 6M  
 $S \rightarrow bA / aB$   
 $A \rightarrow bAA / aS / a$   
 $B \rightarrow aBB / bS / b$
- 8 a) Design Turing machine to recognize the language  $L = \{0^n 1^n 2^n / n \geq 1\}$  8M  
 b) Describe the Chomsky hierarchy of languages and give corresponding automata. 4M

**VARDHAMAN COLLEGE OF ENGINEERING**  
(AUTONOMOUS)

Two Year M. Tech I Semester Regular Examinations April - 2012  
(Regulations: VCE-R11)

**COMPUTER ARCHITECTURE AND ORGANIZATION**  
(Computer Science and Engineering)

Time: 3 hours

Max Marks: 60

**Answer any FIVE Questions. All Questions carry equal marks**  
**All parts of the questions must be answered in one place only**

- |   |  |    |
|---|--|----|
| 1 | a) Draw the logic diagram of a 4-bit synchronous binary counter and explain its operations.  | 6M |
|   | b) Write the truth table for a full adder and derive the simplified Boolean for sum S and carry C. Draw the logic circuit.                                 | 6M |
| 2 | a) What are the different performance measures used to represent a computer systems performance?   | 6M |
|   | b) Differentiate multiprocessor and multi computer.  | 6M |
| 3 | a) Explain the variety of techniques available for sequencing of microinstructions based on the format of the address information in the microinstruction. | 8M |
|   | b) "Hardwired control unit is faster than micro programmed control unit". Justify this statement.  | 4M |
| 4 | a) Draw the structure of a sequential A.L.U and explain the functioning.   | 6M |
|   | b) Draw the diagram for a 4-stage floating point adder. Explain its operation. What is the speed-up $S(4)$ ?   | 6M |
| 5 | a) Describe the one-hot design of the control unit for a 'gcd' processor.  | 6M |
|   | b) Explain the operation of a Micro programmed control unit using a diagram.   | 6M |
| 6 | a) Difference between paging and segmentation.   | 4M |
|   | b) Explain How the logical address will be translated to physical address in paging.   | 8M |
| 7 | a) Discuss about standard serial communication protocols like RS232, USB, IEEE 1394.   | 7M |
|   | b) What are the different kinds of DMA transfer?   | 5M |
| 8 | a) Draw and explain the 8 X 8 omega switch network.  | 6M |
|   | b) Describe the mutual exclusion principle with a semaphore in multiprocessors.  | 6M |

**VARDHAMAN COLLEGE OF ENGINEERING**  
(AUTONOMOUS)

Two Year M. Tech I Semester Regular Examinations April - 2012  
(Regulations: VCE-R11)

**SOFTWARE ENGINEERING**  
(Computer Science and Engineering)

Time: 3 hours

Max Marks: 60

**Answer any FIVE Questions. All Questions carry equal marks**  
**All parts of the questions must be answered in one place only**

- |    |   |                |
|----|---|----------------|
| 1  | a) List the characteristics of Software that distinguish software from hardware.<br>b) What are software engineering layers?<br>c) Explain process characteristics. | 3M<br>3M<br>6M |
| 2  | Describe view point oriented analysis and Method based analysis.  | 12M            |
| 3. | a) Explain about requirements engineering activities<br>b) What is meant by software project estimation? Explain with various empirical models.                     | 6M<br>6M       |
| 4  | a) Explain the design principles for data specification.<br>b) Explain the architectural design process.  | 6M<br>6M       |
| 5  | a) What is software design pattern?<br>b) Explain the concepts of Coupling and Cohesion.<br>c) Explain the design heuristics for effective modularity.              | 2M<br>4M<br>6M |
| 6  | a) What is testability of software?<br>b) Distinguish unit testing and Integration testing.   | 3M<br>9M       |
| 7  | a) List the differences between black box testing and white box testing approaches.<br>b) Differentiate between functional and non-functional testing.              | 8M<br>4M       |
| 8. | a) Explain about software reengineering.<br>b) Explain about software risk management.  | 6M<br>6M       |

**VARDHAMAN COLLEGE OF ENGINEERING**  
(AUTONOMOUS)

Two Year M. Tech I Semester Regular Examinations April - 2012

(Regulations: VCE-R11)

**ARTIFICIAL INTELLIGENCE AND NEURAL NETWORKS**

(Common to Computer Science and Engineering and Software Engineering)

Time: 3 hours

Max Marks: 60

**Answer any FIVE Questions. All Questions carry equal marks**

**All parts of the questions must be answered in one place only**

- |   |  |          |
|---|--|----------|
| 1 | a) Write the algorithm for Breadth First and Depth First search and explain with example.<br>b) What are the differences between Hill climbing procedure and simulated annealing?<br>Write an algorithm for simulated annealing. | 6M<br>6M |
| 2 | a) Explain Conceptual Dependency theory with one example.<br>b) Write WALTZ's algorithm and explain with example.  | 6M<br>6M |
| 3 | a) Explain knowledge acquisition.<br>b) Explain machine learning.  | 6M<br>6M |
| 4 | a) Describe the functions of expert system shell.<br>b) Compare Neural Networks and expert system in terms of knowledge representation and knowledge acquisition.  | 4M<br>8M |
| 5 | a) What is neural network? What are the benefits of neural network.<br>b) Explain different classes of neural network architecture.  | 6M<br>6M |
| 6 | a) Define Learning? Explain error correction learning.<br>b) Explain probably approximately correct model of learning.   | 6M<br>6M |
| 7 | a) Explain adaptive filtering problem for a dynamical system.<br>b) Explain the Idealized Learning Curve of the LMS Algorithm.   | 7M<br>5M |
| 8 | a) Explain the accelerated convergence of Back Propagation Learning.<br>b) Explain the sufficient training set size for a valid generalization.  | 6M<br>6M |

**VARDHAMAN COLLEGE OF ENGINEERING**  
(AUTONOMOUS)

Two Year M. Tech I Semester Regular Examinations April - 2012

(Regulations: VCE-R11)

**EMBEDDED SYSTEMS**

(Common to Computer Science and Engineering and Software Engineering)

Time: 3 hours

Max Marks: 60

**Answer any FIVE Questions. All Questions carry equal marks**  
**All parts of the questions must be answered in one place only**

- |    |   |     |
|----|---|-----|
| 1  | a) Embedded Systems are provided with plenty of peripherals and flash memory as well as RAM. Using these implement a working diagram for an automatic lift to handle four floors. Each floor has a key to record travel direction UP/DOWN. Inside the cabin a key board handles user requests and also a door closure/open key operations. Implement a generic design to optimize the lift operations.  | 8M  |
|    | b) List and explain characteristics of embedded computing applications along with costs involved.   | 4M  |
| 2  | 8051 processor has a Boolean processor with its own 128 bit accumulator.<br>a) Detail the bit level instructions and their use.<br>b) Using these instructions simulate <ul style="list-style-type: none"> <li>i. XOR GATE (Two input)</li> <li>ii. NAND Gate (Two input)</li> </ul>  | 12M |
| 3  | a) List and explain the reasons to use assembly language.   | 6M  |
|    | b) i. Write a program that will swap the bits of each nibble in register R5. Swap bits 0 and 1 with bits 2 and 3, and bits 4 and 5 with bits 6 and 7.<br>ii. Use the R4(LSB) and R5(MSB) as single 16 bit counter and decrement the pair until they are equal.  | 6M  |
| 4  | a) Large number of I/O lines is provided in 8051 to perform external I/O operations. Explain their programming.   | 6M  |
|    | b) Using I/O lines, and a driver circuit, write a programme to run a DC Motor or a Stepper Motor. Explain its operation.  | 6M  |
| 5. | a) How do you distinguish a real time application from a generic application?   | 4M  |
|    | b) The sequence of operations in a real time programme is time critical. Events order is important. With this back ground explain the following terms and give an example to illustrate. <ul style="list-style-type: none"> <li>I). Task and its states               <ul style="list-style-type: none"> <li>i) Idle</li> <li>ii) Waiting</li> <li>iii) Ready</li> <li>iv) Eligible</li> <li>v) Deleted</li> <li>vi) Blocked.</li> </ul> </li> <li>II). What is a Scheduler? Why is it needed?</li> </ul> | 8M  |

Cont...2

- 6 a) Explain the design considerations that have application to a broad range of embedded systems. 4M
- b) A motor cycle uses microprocessor to sequence (I) Ignition system (II) Air fuel control (III) Speed measurement (IC) Current fuel state. In all these the ignition system and Speed control are critical. Keeping a general view explain how you would organize your programs to multiple tasks such that 8M
- i. The engine will not miss an ignition
  - ii. Its evaluation of air/flow ratio is always available
  - iii. The current speed is shown on the speedometer
  - iv. Current fuel current is displayed
- Organize your scheduler.
- 7 Write short notes on 12M
- a) Cross compilers, cross assemblers
  - b) Linker / locator
  - c) Testing embedded software on host machine
- 8 a) ARM processor is in fact two processors in on chip ARM and THUMB. Explain why two processors are built in one system? 4M
- b) The ARM processor uses 32 bit code making it possible to provide multiple operations in a single instruction. Explain a few typical instructions. 4M
- c) The interrupt service is quite powerful in ARM. Explain the need for a fast interrupt service and a normal interrupt service with their own stack operations. 4M



**VARDHAMAN COLLEGE OF ENGINEERING**  
(AUTONOMOUS)

Two Year M. Tech I Semester Regular Examinations April - 2012  
(Regulations: VCE-R11)

**OBJECT ORIENTED ANALYSIS AND DESIGN**  
(Software Engineering)

Time: 3 hours

Max Marks: 60

**Answer any FIVE Questions. All Questions carry equal marks**  
**All parts of the questions must be answered in one place only**

---

- |   |   |     |
|---|---|-----|
| 1 | a) Discuss in detail about the importance of modeling.                                      | 6M  |
|   | b) Define architecture. Draw and explain the architecture for modeling a system.            | 6M  |
| 2 | a) Discuss in detail about the association relationship.                                    | 6M  |
|   | b) Draw and explain the common properties of class diagram                                  | 6M  |
| 3 | a) Enumerate the steps to model the flow of control by organization.                        | 6M  |
|   | b) What are the properties and common uses of sequence and collaboration diagram?           | 6M  |
| 4 | a) Differentiate between activity and state chart diagrams?                                 | 6M  |
|   | b) Define signal? Enumerate the steps to model a family of signals?                         | 6M  |
| 5 | Enumerate the steps to model the following  |     |
|   | a) Modeling process and devices   | 6M  |
|   | b) Modeling distribution of components  | 6M  |
| 6 | What are the 4p's in unified software development? Explain each.                            | 12M |
| 7 | a) Give brief description about the archetypal inception iteration work flow.               | 6M  |
|   | b) Write short notes on the elaboration phase in brief.                                     | 6M  |
| 8 | Explain in detail about the archetypal construction iteration workflow and core work flows. | 12M |

**VARDHAMAN COLLEGE OF ENGINEERING****(AUTONOMOUS)**

Two Year M. Tech I Semester Regular Examinations April - 2012

**(Regulations: VCE-R11)****ADVANCED DATA COMMUNICATIONS****(Common to Digital Electronics and Communication Systems and Wireless and Mobile Communications)****Time: 3 hours****Max Marks: 60****Answer any FIVE Questions. All Questions carry equal marks****All parts of the questions must be answered in one place only**

- |   |  |     |
|---|--|-----|
| 1 | a) Explain the tradeoff between Bandwidth and SNR in Shannon's information capacity.   | 4M  |
|   | b) Determine the peak frequency deviation, minimum bandwidth for a binary FSK with a mark frequency of 49KHz, a space frequency of 51KHz and an input bit rate of 5Kbps. | 4M  |
|   | c) Explain a simple Circuit to recover clocking information for the received data.   | 4M  |
| 2 | a) For a QPSK system and the given parameters, determine   | 6M  |
|   | i. Carrier power in dBm  |     |
|   | ii. Noise power in dBm   |     |
|   | iii. $E_b/N_0$ ratio   |     |
|   | iv. Carrier to Noise power ratio.  |     |
|   | $C=10^{-13}W$ , $f_b=30kbps$ , $N=0.06 \times 10^{-15}W$ , $B=60KHz$   |     |
|   | b) Draw the constellation diagram for the following  | 6M  |
|   | i. QPSK with a peak amplitude value of 4   |     |
|   | ii. 8-QAM with two different peak amplitude values 1 and 3 and four different phases.  |     |
| 3 | a) Explain about the LAN, WAN, MAN.  | 8M  |
|   | b) What are the advantages of multipoint connection over point-to-point connection?  | 2M  |
|   | c) What are the advantages of distributed processing?  | 2M  |
| 4 | a) Explain about data communication circuits.  | 8M  |
|   | b) Discuss Simplex and Duplex Transmission modes   | 4M  |
| 5 | a) Explain about T1 digital carrier system.  | 10M |
|   | b) List the advantages and disadvantages of WDM.   | 2M  |
| 6 | a) Explain briefly the Hamming encoding Algorithm with suitable example.   | 5M  |
|   | b) Write the mechanism for Stop and Wait flow control  | 5M  |
|   | c) "Cyclic codes are extremely well-suited for error detection". Give two reasons that support the statement.  | 2M  |
| 7 | a) Discuss about high level data link protocol (HDLC) in detail.   | 8M  |
|   | b) Briefly explain asynchronous data link protocols.   | 4M  |
| 8 | a) Describe the packet switching by using following approaches:  | 8M  |
|   | i. Virtual Circuits  |     |
|   | ii. Datagram Approach  |     |
|   | b) Compare a TSI to a TDM bus.   | 4M  |

**VARDHAMAN COLLEGE OF ENGINEERING**  
(AUTONOMOUS)

Two Year M. Tech I Semester Regular Examinations April - 2012  
(Regulations: VCE-R11)

**ADVANCED DIGITAL SIGNAL PROCESSING**

(Common to Digital Electronics and Communication Systems and Wireless and Mobile Communications)

Time: 3 hours

Max Marks: 60

**Answer any FIVE Questions. All Questions carry equal marks**  
**All parts of the questions must be answered in one place only**

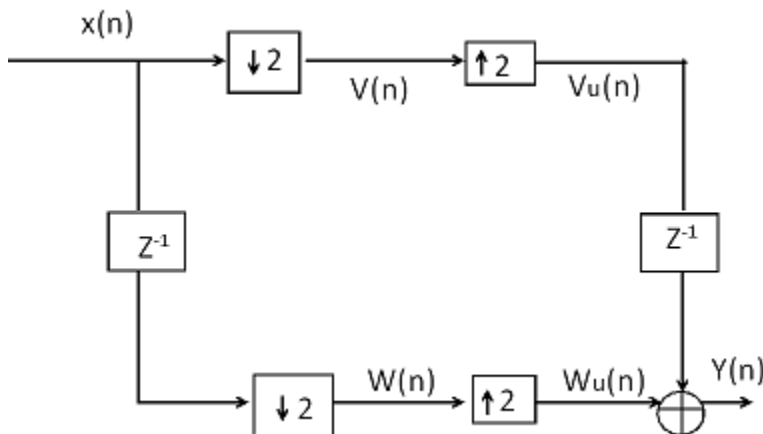
- 1 a) Find the parallel form realization of the following 6M

$$H(z) = \frac{3z(5z-2)}{(z+\frac{1}{2})(3z-1)}$$

- b) Draw the cascaded form of the following 6M

$$H(z) = \frac{(1-z^{-1})^3}{(1-\frac{1}{2}z^{-1})(1-\frac{1}{8}z^{-1})}$$

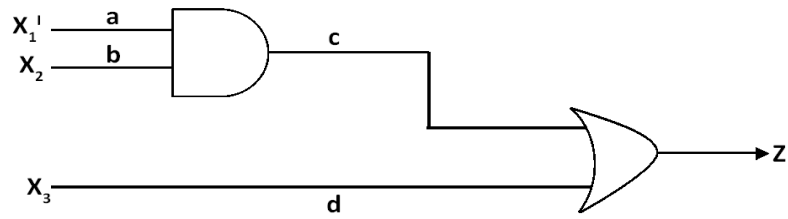
- 2 A For the Multirate system shown below find  $y(n)$  as a function of  $x(n)$ ? 6M



- b) Explain about decimation process? 6M
- 3 What is Filter-Bank? Discuss about Uniform DFT filter bank and Quadrature mirror filter bank. 12M
- 4 a) What is a Linear prediction filter? Explain its properties. 6M  
b) Explain about Levinson-Durbin algorithm. 6M
- 5 What is power spectrum? Explain Welch, Bartlett methods and also compare non-parametric methods. 12M
- 6 a) What is auto correlation? Explain about its properties. 6M  
b) Explain about AR and ARMA processes. 6M
- 7 a) Derive expressions for Wiener-Hopf equations. 6M  
b) Explain principle of orthogonality. 6M
- 8 Write the expressions for computing Kalman Gain? 12M



- 7 a) Discuss in detail about bridging fault model 6M  
b) Draw the table giving the set of all possible single stuck faults and the faulty and fault-free responses and also construct the fault cover table for the circuit shown in below 6M



- 8 a) Draw the circuit which realizes the function  $F(x) = x_1 x_2 + x_3 x_4$  using AND – OR gates 6M  
using Boolean difference method. Obtain the test set to detect SA0 and SA1 fault on input line  $x_1$  of the circuit  
b) Describe the algorithmic steps involved in PODEM 6M

**VARDHAMAN COLLEGE OF ENGINEERING**  
(AUTONOMOUS)

Two Year M. Tech I Semester Regular Examinations April - 2012  
(Regulations: VCE-R11)

**CMOS VLSI DESIGN**

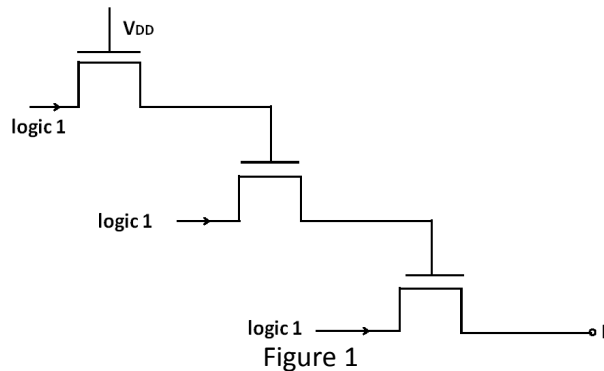
(Digital Electronics and Communication Systems)

Time: 3 hours

Max Marks: 60

**Answer any FIVE Questions. All Questions carry equal marks**  
**All parts of the questions must be answered in one place only**

- 1 a) Explain the current-voltage characteristics of MOSFET based on Square law model. 6M  
b) Define Threshold Voltage. Express threshold voltage and discuss dependency of  $V_T$  on various parameters. 6M
- 2 a) Explain and derive the necessary DC region equations of a CMOS inverter. 8M  
b) Explain the DC noise margin of CMOS logic. 4M
- 3 a) Bring out the differences between Pass Transistor logic and transmission gate logic style from the transfer characteristics. 6M  
b) Find the value at the point P mentioned in the circuit shown in figure 1 for the given values and explain it. 6M



$$V_{DD}=5V; V_{TP}=1V; \text{logic1}=5V$$

- 4 a) Design and explain the operation of 2 input NMOS NAND. 6M  
b) Explain the procedure to design an adder circuit using CMOS logic. 6M
- 5 a) Discuss the transient analysis of CMOS Transmission gate by replacing it with resistor equivalent circuit. 6M  
b) Design an EX-OR gate using Transmission gate Logic. 6M
- 6 a) Draw and explain the operation of a single bit dynamic RAM cell. 6M  
b) Draw the clock generation circuit of CMOS and explain the operation of the same with an example. 6M
- 7 a) Explain the concept of charge storage and charge leakage associated with pass transistor logic. 6M  
b) Explain the term "Scaling" related to MOS circuits. 6M
- 8 a) What is Dual Rail-logic network and explain it briefly. 6M  
b) Draw and explain the basic structure of CVSL logic. 6M

**VARDHAMAN COLLEGE OF ENGINEERING**  
(AUTONOMOUS)

Two Year M. Tech I Semester Regular Examinations April - 2012  
(Regulations: VCE-R11)

**DETECTION AND ESTIMATION THEORY**

(Common to Digital Electronics and Communication Systems and Wireless and Mobile Communications)

Time: 3 hours

Max Marks: 60

Answer any FIVE Questions. All Questions carry equal marks

All parts of the questions must be answered in one place only

- 1 a) The following binary hypothesis testing problem is 6M  
 $H_1 : r = s+n$   
 $H_0 : r = n$  and  

$$p_n(N) = \frac{1}{\sqrt{2\pi}\sigma} \exp\left(-\frac{N^2}{2\sigma^2}\right)$$
- b) Explain composite hypothesis testing problem with an example 6M
- 2 a) Write short notes on sampling band limited random signals. 6M  
b) Prove for the stationary random process  $X(t)$  that  $R_x(\tau) \leq R_x(0)$  for  $\tau=t_1-t_2 \neq 0$ ? 6M
- 3 a) What are the steps involved in detection and estimation in white Gaussian noise? 6M  
b) Derive an expression for the probability of detection and error probability in terms of distance, for known signal in the additive white Gaussian noise detection problem 6M
- 4 Derive solution for the optimum receiver for the simple binary detection problem of a known signal in non white Gaussian noise using the following realization techniques?  
a) Whitening realization 6M  
b) Correlator realization 6M
- 5 a) Discuss Neyman-pearson criterion for radar detection problems. How is this better than other detection schemes 6M  
b) Consider following detection problem: 6M  
 $X=s+n$ , where  $s$  is either  $+1$  or  $-1$  with equal probability and ' $n$ ' has pdf shown below:

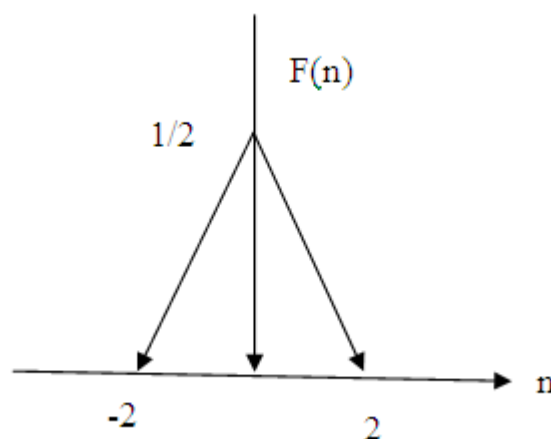


Figure 1

A single sample is taken and compared with a threshold set at 0:

If  $x \geq 0$ ,  $+1$  is declared present

If  $x \leq 0$ ,  $-1$  is declared present

Calculate  $P_e$ , the probability of error for this detection scheme.

- 6 Explain briefly the following multi dimensional problems with neat diagrams? 6M
- a) Multi level modulation system 6M
  - b) Multi channel system
- 7 Draw and explain Kalman filter for the cases 6M
- a) Signal and observation model 3M
  - b) Optimum Kalman filter 3M
  - c) Simultaneous estimation and prediction
- 8 Let  $r(u)=a(u)+n(u)$  for  $0 \leq u < t$ , where  $a(u)$  &  $n(u)$  are uncorrelated processes with spectra 12M
- $$s_a(\omega) = \frac{2KP}{\omega^2 + k^2} \text{ and } s_n(\omega) = \frac{N_0}{2}$$
- And the desired signal is  $x(t)=a(t)$
- i. Find optimum linear filter to estimate  $x(t)$  and the variance equation.
  - ii. Solve the variance equation for steady state case.



**VARDHAMAN COLLEGE OF ENGINEERING**  
(AUTONOMOUS)

Two Year M. Tech I Semester Regular Examinations April - 2012  
(Regulations: VCE-R11)

**CPLD AND FPGA ARCHITECTURES AND APPLICATIONS**  
(Digital Electronics and Communication Systems)

Time: 3 hours

Max Marks: 60

**Answer any FIVE Questions. All Questions carry equal marks**  
**All parts of the questions must be answered in one place only**

- |   |    |   |    |
|---|----|---|----|
| 1 | a) | What are the various methodologies of FPGA? Explain the same with neat diagram?   | 6M |
|   | b) | Explain in detail about FPGA based system design?   | 6M |
| 2 | a) | Why SRAM based FPGAs are popular when compared to other types? Explain?   | 6M |
|   | b) | Explain one time programmable (OTP) based FPGA? Explain its basic programming elements?   | 6M |
| 3 | a) | Explain in detail about circuit design of FPGA fabrics.   | 6M |
|   | b) | Realize switching function (2, 3, 4, 6, 7) using 2 input LUTs. Give the truth table implementation in each LUT SWOW wires in FPGA.  | 6M |
| 4 | a) | What are the key parameters to be considered while designing a logic circuit?   | 6M |
|   | b) | How these parameters are interrelated to each other and how to optimize the circuit for higher performance?   | 6M |
| 5 | a) | Explain different sequential design styles with neat sketches.  | 6M |
|   | b) | Explain in detail about syntax directed translation.  | 6M |
| 6 | a) | Explain the rules for clocking in FSM design?   | 6M |
|   | b) | Design encoder ESM, whose state transition table has current state 000, 001, 010, 011, 100, 101, 110, 111 and next state 001, 010, 011, 100, 110, 111, 000 respectively. Implement the design on Xilinx XC 4000 FPGA. | 6M |
| 7 | a) | Design a BCD counter using appropriate programmable logic elements or device.   | 6M |
|   | b) | Explain in detail about programmable sum – of – products arrays.  | 6M |
| 8 | a) | With the help of neat sketches describe ALTERA's FLEX logic 8000 series.  | 6M |
|   | b) | Compare and list out the advantages of ALTERA's logic 8000 with Xilinx XC 4000.   | 6M |

**VARDHAMAN COLLEGE OF ENGINEERING**  
(AUTONOMOUS)

Two Year M. Tech I Semester Regular Examinations April - 2012  
(Regulations: VCE-R11)

**POWER SEMICONDUCTOR DEVICES**  
(Power Electronics and Electric Drives)

Time: 3 hours

Max Marks: 60

**Answer any FIVE Questions. All Questions carry equal marks**  
**All parts of the questions must be answered in one place only**

- 
- |   |   |          |
|---|---|----------|
| 1 | a) Distinguish controlled and un-controlled devices.<br>b) Analyze V-I characteristics of various real switching devices.   | 6M<br>6M |
| 2 | a) Explain the following types of power diodes<br>i. Schotky Diode<br>ii. Line Frequency Diodes and<br>iii. Fast Recovery Diodes.<br>b) Explain switching characteristics of power diodes and specify their voltage and current ratings.  | 6M<br>6M |
| 3 | a) Give spice model for power BJT<br>b) Write a brief note on driver circuit.   | 6M<br>6M |
| 4 | a) Discuss the operation of enhancement and depletion type power MOSFETs.<br>b) Explain the ratings and specifications of power MOSFETs.  | 6M<br>6M |
| 5 | a) Discuss the switching characteristics of IGBT<br>b) Describe the construction and working of IGBT.   | 6M<br>6M |
| 6 | a) Discuss the safe operating area of Thyristor.<br>b) Design the snubber circuit for Thyristor   | 4M<br>8M |
| 7 | a) With the help of neat sketch, explain the electrical equivalent circuit of thermal model of a power device.<br>b) Explain about heat sink consider an aluminum rod with measurement height, $h=1\text{cm}$ , breadth= $1\text{cm}$ and length= $20\text{cm}$ . The rate of heat energy entering at the left end (where the temperature is $T_2$ ) is $3\text{W}$ and the temperature at the right surface is $T_1=40^\circ\text{C}$ . Find $T_2$ . (Thermal conductivity $\lambda=200\text{w}\cdot\text{m}^{-1}\text{O}_\text{c}^{-1}$ ) | 6M<br>6M |
| 8 | a) Discuss the design of line frequency inductor and transformers.<br>b) An air core inductance of $50\mu\text{H}$ is made as a wound strip of copper, $40\text{mm}$ wide and $1.5\text{mm}$ thick. For cooling purposes, $\frac{1}{2}\text{mm}$ spacing is used between each turn with an inner diameter of $60\text{mm}$ and an outer diameter of $160\text{mm}$ as physical constraints. Can the required inductance be achieved?  | 8M<br>4M |

**VARDHAMAN COLLEGE OF ENGINEERING**  
(AUTONOMOUS)

Two Year M. Tech I Semester Regular Examinations April - 2012  
(Regulations: VCE-R11)

**PRINCIPLES OF MACHINE MODELING ANALYSIS**  
(Power Electronics and Electric Drives)

Time: 3 hours

Max Marks: 60

**Answer any FIVE Questions. All Questions carry equal marks**  
**All parts of the questions must be answered in one place only**

- |   |    |  |    |
|---|----|--|----|
| 1 | a) | Explain with neat sketch the magnetically coupled circuits.  | 6M |
|   | b) | Derive the power angle equation and explain the power angle characteristics of a synchronous machine.  | 6M |
| 2 | a) | Explain the Leakage fluxes in a machine with more than two windings.   | 6M |
|   | b) | Explain how can a differential equation for an A.C. circuit or machine be converted to a phasor equation.  | 6M |
| 3 | a) | Explain the mathematical model of a separately excited D.C. motor  | 6M |
|   | b) | A 230V, separately excited DC motor is driving a constant load torque, with the following data $r_a=0.4\Omega$ , $L_a=0.01H$ , $r_z=115\Omega$ , motor torque constant $D=0$ , the armature current is 50Amps, with the rated voltage across the Armature and field. Determine the magnitude of constant load torque. If the armature voltage is suddenly reduced by 20 volts. Find the speed as a function of time. Total $J=12Kgm^2$ . | 6M |
| 4 | a) | Explain the linear transformation technique with examples  | 6M |
|   | b) | Explain the phase transformation technique (a,b,c to $\alpha, \beta, 0$ ).   | 6M |
| 5 | a) | Explain the generalized mathematical model of a 3-phase induction motor.   | 6M |
|   | b) | Obtain the expression for flux linkages in the two-axis model for a 3-phase induction motor from $\phi_a, \phi_b$ and $\phi_c$ values.   | 6M |
| 6 | a) | Explain the Two-axis model of 3phase induction motor.  | 6M |
|   | b) | Explain the steady state analysis with equivalent circuit of 3-phase induction motor.  | 6M |
| 7 | a) | Explain induction motor dynamics during starting and braking.  | 6M |
|   | b) | Explain Acceleration, braking and reversing time.  | 6M |
| 8 | a) | Explain the two-axis representation of a synchronous machine.  | 6M |
|   | b) | Develop the state space voltage-current equation of synchronous machine.   | 6M |

**VARDHAMAN COLLEGE OF ENGINEERING**  
(AUTONOMOUS)

Two Year M. Tech I Semester Regular Examinations April - 2012  
(Regulations: VCE-R11)

**POWER ELECTRONIC CONVERTERS-1**  
(Power Electronics and Electric Drives)

Time: 3 hours

Max Marks: 60

**Answer any FIVE Questions. All Questions carry equal marks**  
**All parts of the questions must be answered in one place only**

- 1 Explain the operation of single-phase AC voltage controller with resistive and resistive-inductive loads with the help of neat circuit diagram and output voltage and current wave forms. 12M
  
- 2 The Three-Phase bidirectional-delta connected controller has a resistive load of  $R=10\Omega$ . The line to line voltage is  $V_s=208$  Volts (RMS), 60Hz and the delay angle is  $\alpha=2\pi/3$ . Determine 12M
  - i) The RMS output phase voltage
  - ii) The expressions for instantaneous currents
  - iii) The RMS output phase current and RMS line current
  - iv) The input power factor
  - v) The RMS current of a thyristor
  
- 3 Describe the basic principle of working of single phase to single phase step down cyclo converter for both continuous and discontinuous conductions for a bridge type cyclo converter with circuit and waveforms. Mark the conduction of various thyristors also. 12M
  
- 4 a) Explain operation of single phase full wave fully controlled rectifier circuit with highly inductive load and draw the following: 6M
  - i) Input voltage wave form
  - ii) Input current wave form
  - iii) Output voltage and current wave form
  - iv) Voltage across a single SCR.
 b) A two pulse midpoint converter feeds an highly inductive load having a resistance of 15 Ohms. It is fed from a 220V, 50Hz, source using a centre tapped transformer having a turns ratio 1:1:1. For a firing angle of 60 degrees determine 6M
  - i) The average output voltage and current
  - ii) RMS value of primary current
  - iii) RMS value of harmonic content
  - iv) The power factor
  - v) The harmonic reactive power.
  
- 5 a) Explain the operation of a Three-Phase 12 Pulse converter along the necessary circuit diagrams and wave forms. 6M
- b) Evaluate the input power factor and harmonic factors for a Three-Phase half controlled converters. 6M

- 6 a) Briefly explain 6M  
    i) Step-up chopper  
    ii) Step-down chopper
- b) A step-up chopper is used to deliver load voltage of 500V from a 220V DC source. If the blocking period of the thyristor is  $80\mu\text{s}$ . compute the required pulse-width. 6M
- 7 a) What is an inverter? What help of circuit and waveforms explain the operation of single phase bridge inverter. 6M
- b) Draw the waveforms and discuss the performance of following methods of PWM control used in inverters. 6M  
    i) Symmetrical multiple pulse modulation  
    ii) Sinusoidal pulse width modulation
- 8 a) Explain the three phase thyristorised bridge inverter with star connected resistance load, assuming  $120^\circ$  mode of operation. Draw the corresponding output phase and line voltage of inverter. 6M
- b) A basic three phase bridge inverter is supplied from a 600V source. For a star connected resistive load of  $15\Omega/\text{phase}$ . Find the RMS load current, the load power and the thyristor ratings for 6M  
    i)  $120^\circ$  conduction  
    ii)  $180^\circ$  conduction

**VARDHAMAN COLLEGE OF ENGINEERING****(AUTONOMOUS)**

Two Year M. Tech I Semester Regular Examinations April - 2012

**(Regulations: VCE-R11)****POWER ELECTRONIC CONTROL OF DC DRIVES****(Power Electronics and Electric Drives)****Time: 3 hours****Max Marks: 60****Answer any FIVE Questions. All Questions carry equal marks****All parts of the questions must be answered in one place only**

1. a) Derive the expressions for average load voltage and load current for single phase full converter fed separately excited D.C. motor. Draw the output voltage and current wave forms for  $\alpha = 60^\circ$ . Assume continuous conduction 6M  
 b) A 200 Volts, 875 RPM, 150 A separately excited D.C. motor has an armature resistance of 0.06 ohms. It is fed from a single phase fully controlled rectifier with an ac source voltage of 220V, 50 Hz. Assuming continuous conduction, calculate 6M
  - i. Firing angle for rated motor torque and 750 RPM.
  - ii. Firing angle for rated motor torque and (-500) RPM.
2. a) Explain the operation of three – phase double converter. 6M  
 b) Explain the operation of three-phase semi converter for continuous and discontinuous modes of operation. 6M
3. a) Explain the operation of three – phase fully controlled rectifier for firing angle of  $60^\circ$  in case of R-L load. Also derive the expression for average output voltage for the same firing angle. 6M  
 b) Explain the effect of source impedance on the operation of three-phase controlled rectifier in steady state. 6M
4. Draw the schematic diagram of speed controlled two-quadrant separately excited DC motor drive and explain its operation in detail. 12M
5. a) Draw and explain the block diagram of the overall closed – loop system of phase controlled DC motor drive. Also explain the block diagram of current – control loop. 6M  
 b) Explain about harmonics and associated problems in phase controlled DC motor drives. 6M
6. a) With neat sketches and wave forms, explain the operation of four – quadrant chopper circuit. 6M  
 b) Describe the steady – state performance of Chopper – Controlled DC motor drive with average values by neglecting harmonics. 6M
7. a) Explain the pulse width modulation (PWM) current controller used in speed control of chopper fed DC motor. 6M  
 b) Discuss the design principles of speed and current controllers used in chopper fed DC motor. 6M
8. a) Explain the dynamic simulation of the speed controlled DC motor drive with the help of the time-domain model. 6M  
 b) Draw the flow chart for the dynamic simulation of the Chopper – controlled DC motor drive. 6M

**VARDHAMAN COLLEGE OF ENGINEERING**  
(AUTONOMOUS)

Two Year M. Tech I Semester Regular Examinations April - 2012  
(Regulations: VCE-R11)

**ADVANCED MICROPROCESSOR AND MICRO CONTROLLERS**  
(Power Electronics and Electric Drives)

Time: 3 hours

Max Marks: 60

**Answer any FIVE Questions. All Questions carry equal marks**  
**All parts of the questions must be answered in one place only**

- |   |  |    |
|---|--|----|
| 1 | a) Explain the General and Special functions of General Purpose Registers in 8086 processor.   | 6M |
|   | b) What is meant by addressing mode? Explain the 8086 addressing modes for control transfer instructions.  | 6M |
| 2 | a) Why 8086 memory is mapped into 2 byte wide banks? What logic levels are found with $\overline{\text{BHE}}$ & $\text{A}_0$ when 8086 reads a word from the address 0808H?                          | 6M |
|   | b) What is the difference between Minimum and Maximum mode operation of 8086?  | 6M |
| 3 | a) What is the difference between Maskable & Non Maskable interrupts? Explain the operation of single step interrupt in 8086 processor.  | 4M |
|   | b) Using string instructions develop a 8086 ALP that will search a word present or not in a given string of N words. If the word is present store 'Y' in 2000H memory location, otherwise store 'N'. | 8M |
| 4 | a) What do you mean by paging? Discuss the paging mechanism of 80386 processor.  | 8M |
|   | b) List the salient features of Pentium Pro Processor.   | 4M |
| 5 | a) Explain control word register formats in various modes of operation of 8255.  | 6M |
|   | b) Interface a typical 8 bit DAC with 8255 and write a program to generate a triangular waveform of +4V amplitude. Assume the reference voltage of DAC is connected to +5V.                          | 6M |
| 6 | a) With neat circuit diagram explain the interfacing of 8251 with 8086.  | 6M |
|   | b) Draw the block diagram of PIC 8259A and explain the function of each block  | 6M |
| 7 | a) Explain internal and external memory organization in 8051 microcontroller.  | 6M |
|   | b) What is an addressing mode? With an example, explain 8051 microcontroller addressing modes.   | 6M |
| 8 | a) What is the difference between JMP and CALL instructions? Explain various CALL instructions in 8051 microcontroller.  | 6M |
|   | b) Write a program to generate 5KHz Square wave at port 3.2 bit using Timer 1 mode 2 operation. Assume that crystal oscillator frequency of 11.0592 MHz.   | 6M |

**VARDHAMAN COLLEGE OF ENGINEERING**  
(AUTONOMOUS)

Two Year M. Tech I Semester Regular Examinations April - 2012  
(Regulations: VCE-R11)

**ENERGY CONVERSION SYSTEM**  
(Power Electronics and Electric Drives)

Time: 3 hours

Max Marks: 60

**Answer any FIVE Questions. All Questions carry equal marks**  
**All parts of the questions must be answered in one place only**

- |   |  |    |
|---|--|----|
| 1 | a) Describe the principle of solar photo voltaic energy conversion.  | 6M |
|   | b) Explain briefly applications of super conducting materials in electrical equipment systems.   | 6M |
| 2 | a) Write short note on open and closed loop cycle MHD system.  | 5M |
|   | b) Calculate the open CKT voltage and maximum power output of MHD generator of plate area $0.2 \text{ m}^2$ . The gas is moving with uniform velocity $1000 \text{ m/s}$ between the plate at $0.5 \text{ m}$ apart in the magnetic flux density $2 \text{ wb/m}^2$ . Assume the conductivity of the gas is $10^{15} \text{ /m}$ | 7M |
| 3 | a) Explain the various types of wind turbine briefly.  | 6M |
|   | b) Describe the operational characteristics of wind turbines.  | 6M |
| 4 | a) Explain the various methods of tidal power generation? What are the limits of each method?  | 6M |
|   | b) Find the average power developed in the tidal plant of design area $1 \text{ km}^2$ and range of tide is $7.8 \text{ m}$ , in a single as well as in double effect scheme if the tide cycle is $6 \text{ hour } 12.5 \text{ min}$ . Also find actual energy available from turbine.   | 6M |
| 5 | a) Discuss the principle of operation of wave energy conversion. What do you understand by power content of a wave.  | 8M |
|   | b) What are the advantages and limitations of wave energy conversion?  | 4M |
| 6 | a) Describe briefly a thermo electric power generator.   | 6M |
|   | b) Describe various schemes of gasification and liquifiction of coal.  | 6M |
| 7 | a) Derive the expressions for free energy and potential of the fuel.   | 6M |
|   | b) Describe the Global energy position and environmental effects of fuel cells.  | 6M |
| 8 | a) What is a fuel cell and describe the principle of working of a fuel cell with reference to $\text{H}_2\text{-O}_2$ cell?  | 7M |
|   | b) Describe pollution from coal and explain the preventive measures taken at steam stations.   | 5M |



**VARDHAMAN COLLEGE OF ENGINEERING****(AUTONOMOUS)**

Two Year M. Tech I Semester Regular Examinations April - 2012

**(Regulations: VCE-R11)****SOFTWARE REQUIREMENTS AND ESTIMATION****(Software Engineering)****Time: 3 hours****Max Marks: 60****Answer any FIVE Questions. All Questions carry equal marks****All parts of the questions must be answered in one place only**

- 
- |   |  |          |
|---|--|----------|
| 1 | Explain good practices adopted for software requirements engineering. Explain how the requirements process can be improved.  | 12M      |
| 2 | a) Discuss how risk reduction can be done by prototyping<br>b) Discuss how to verify requirements quality  | 6M<br>6M |
| 3 | What is meant by requirements modeling? Discuss about state transition and class diagrams with suitable examples   | 12M      |
| 4 | a) Explain the requirements management principles and procedures.<br>b) Represent the links between requirements and other system elements in a requirements Traceability Matrix. What are the specific steps to be considered to implement requirements traceability on a specific project? | 6M<br>6M |
| 5 | a) List out the benefits in using requirements Management Tools?<br>b) Draw the figure how the requirements Management Tools integrate with other kinds of software tools. Explain about Rational Requisite Pro.   | 6M<br>6M |
| 6 | a) What are the components of Software estimation? Discuss them in detail.<br>b) Discuss the key project factors that influence estimation   | 6M<br>6M |
| 7 | a) Explain the MARK II FPA<br>b) Explain the LOC estimation  | 6M<br>6M |
| 8 | Write short notes in the following:<br>i. SLIM TOOLS<br>ii. COCOMO II<br>iii. Putnam Estimation Model  | 12M      |

**VARDHAMAN COLLEGE OF ENGINEERING****(AUTONOMOUS)**

Two Year M. Tech I Semester Regular Examinations April - 2012

**(Regulations: VCE-R11)****SOFTWARE PROCESS AND PROJECT MANAGEMENT****(Software Engineering)****Time: 3 hours****Max Marks: 60****Answer any FIVE Questions. All Questions carry equal marks****All parts of the questions must be answered in one place only**

- |   |   |          |
|---|---|----------|
| 1 | What is meant by software process maturity? Discuss the software maturity Frame work.   | 12M      |
| 2 | a) List out the various process reference models. Write the significance of capability maturity model.<br>b) Differentiate PSP and TSP.   | 6M<br>6M |
| 3 | a) Discuss the Waterfall model needs in software development.<br>b) Based on what parameters software cost can be estimated? Explain.   | 6M<br>6M |
| 4 | a) Why the "Elaboration phase is the most critical of four phases of software life cycle" explain.<br>b) What are the primary objectives, essential activities of production stage?   | 6M<br>6M |
| 5 | a) What are the activities involved in the software process work flows?<br>b) Discuss about the major milestones which occur at the transition points between software project life cycle phases.   | 6M<br>6M |
| 6 | a) List Software Management team activities.<br>b) Write about change Management team activities in iterative process.  | 6M<br>6M |
| 7 | a) Explain about measurable elements of the progress towards project goals and quality of the software product.<br>b) Implement complete SPCP approach to maintain online version status of evolving artifacts.                               | 8M<br>4M |
| 8 | a) "An objective case-study is a true indicator of a mature organization". Explain this based on significance of case-study with an example.<br>b) What are the objectives of core metrics of CCPDS-R and explain how these will be achieved. | 6M<br>6M |

**VARDHAMAN COLLEGE OF ENGINEERING**  
(AUTONOMOUS)

Two Year M. Tech I Semester Regular Examinations April - 2012  
(Regulations: VCE-R11)

**TELECOMMUNICATION SWITCHING SYSTEMS AND NETWORKS**  
(Wireless and Mobile Communications)

Time: 3 hours

Max Marks: 60

**Answer any FIVE Questions. All Questions carry equal marks**  
**All parts of the questions must be answered in one place only**

- 
- |   |   |    |
|---|---|----|
| 1 | a) Explain in detail about basics of switching system.  | 6M |
|   | b) Write short notes on evolution of telecommunications.  | 6M |
| 2 | a) Explain in detail about centralized SPC.   | 6M |
|   | b) Given that MTBF=2000hrs and MTTR=4hrs. Calculate unavailability for single and dual processor systems.   | 6M |
| 3 | a) Derive an expression for the blocking probability of a TSTS switch if each stage is individually non-blocking.   | 6M |
|   | b) Calculate the number of trunks, number of memory words and cost that can be supported on a time multiplexed space switch, given that   | 6M |
|   | i. 32 channels are multiplexed in each stream   |    |
|   | ii. Control memory access time is 100ns   |    |
|   | iii. Bus switching and transfer time is 100ns per transfer.   |    |
| 4 | a) Explain basic common channel signaling and also CCS signaling message format for single unit and three unit message.   | 6M |
|   | b) A telephone administration provides leased lines at the rate of Rs. 600 per km for a minimum rental period of 3 months. A heavy point-to-point traffic user has his offices located 600km apart and is confronted with the choice of using STD or leased lines. At what traffic volume per day should be moved over to leased line? Assume 20 working days per month and a rate of Rs.1 per unit recorded by the meter and also cost of STD calls per hour over a distance of more than 500km is Rs.20 per minute. | 6M |
| 5 | a) The introduction of stored program controlled exchanges has led to the channel associated signaling (CAS) to be replaced by common channel signaling. Explain why?   | 6M |
|   | b) With the aid of block diagram explain about PCM signaling.   | 6M |
| 6 | a) What are the features of the ATM? Explain the principles and operation of ATM switch with diagram.   | 6M |
|   | b) An ATM network uses transmission link that operate at 150 Mbits/s and have a propagation of 5 $\mu$ s per km. It uses cells of length 53 octets, consisting of 5-octet header and a 48 bit information field. The maximum delay introduced by a switching centre is 300 cells. Find the maximum delay encountered by a telephone call over a connection of length 500 km that passes through six switching centres.  | 6M |
| 7 | a) What do you mean by congestion with respect to telecommunication system and how it can be handled at exchange?   | 6M |
|   | b) During the busy hour, 1200 calls were offered to a group of trunks and six were lost. The average call duration is 3min. Find  | 6M |
|   | i. The traffic offered  |    |
|   | ii. The traffic carried   |    |
|   | iii. The traffic lost   |    |
|   | iv. Grade of service  |    |
|   | v. The total duration of period of service  |    |
| 8 | a) Explain signaling mechanisms used in ISDN network.   | 6M |
|   | b) What are the principles of ISDN. Explain the ISDN architecture with neat diagram.  | 6M |

**VARDHAMAN COLLEGE OF ENGINEERING**  
(AUTONOMOUS)

Two Year M. Tech I Semester Regular Examinations April - 2012  
(Regulations: VCE-R11)

**INTERNETWORKING AND INTERNET PROTOCOLS**  
(Wireless and Mobile Communications)

Time: 3 hours

Max Marks: 60

**Answer any FIVE Questions. All Questions carry equal marks**  
**All parts of the questions must be answered in one place only**

- 1 a) Explain principles of Internetworking and its applications. 6M  
b) Distinguish between Connectionless and connection oriented networks. Which is reliable network connection, justify. 6M
- 2 a) Explain Address Resolution Protocol (ARP). 6M  
b) Explain Wire Less LANS IEEE standards 802.11 with suitable examples. 6M
- 3 a) Define fragmentation. What are the different types of fragmentations? Explain in detail. 9M  
b) Is fragmentation needed in concatenated virtual circuits Internet or only in Datagram circuits? 3M
- 4 a) What is the need of routing in a network? List out various routing algorithms. 4M  
b) Consider the subnet of figure 1, distance vector routing is used and the following vectors have just coming to router C from B(5, 0, 8, 12, 6, 2) from D(16, 12, 6, 0, 9, 10) and from E(7, 6, 3, 9, 0, 4). The measured delays to B, D and E are 6,3 and 5 respectively. What is C's new routing table? Give the both outgoing line to views and expected delay? 8M

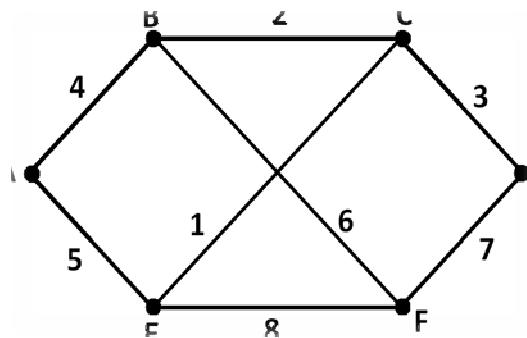


Figure 1

- 5 Define Multicasting. Explain Multicast Routing and applications. 12M
- 6 a) Draw the FTP header format with neat sketch. 6M  
b) What is purpose of DNS server? How it manages the constantly growing domain name spaces. 6M
- 7 a) In all possible scenarios briefly explain the architecture of Electronic Mail. 6M  
b) Draw the header frame format of ICMP and explain all components in it. 6M
- 8 Write short notes on
  - a) Digital Signature 3M
  - b) Proxy Firewall 5M
  - c) Packet-Filter Firewall 4M

**VARDHAMAN COLLEGE OF ENGINEERING**  
(AUTONOMOUS)

Two Year M. Tech I Semester Regular Examinations April - 2012  
(Regulations: VCE-R11)

**OPTICAL COMMUNICATION TECHNOLOGY**  
(Wireless and Mobile Communications)

Time: 3 hours

Max Marks: 60

Answer any FIVE Questions. All Questions carry equal marks

All parts of the questions must be answered in one place only

- |   |   |
|---|---|
| 1 | a) Derive the wave equation for step index fiber and discuss the cut off conditions. <span style="float: right;">6M</span><br>b) Explain the microscopic and macroscopic bending losses in optical fibers and remedy steps. <span style="float: right;">6M</span>   |
| 2 | a) Consider the components of WDM link. Each multiplexor and de-multiplexor introduces cross talk from adjacent channels that is C dB below the desired channel. <span style="float: right;">6M</span><br>i. Compute the cross talk at the output when N stages are cascaded.<br>ii. What must be C so that the overall cross talk penalty after 5 stages is less than 1dB?<br>b) Describe how dispersion managed soliton system overcomes the problems of conventional soliton system. <span style="float: right;">6M</span> |
| 3 | a) Explain the design of an isolator using faraday rotator. <span style="float: right;">6M</span><br>b) Explain the concept of Mach – Zehnder Inter ferometry and if a 2x2 MZI is used as a multiplexer for two WDM channels at a frequency separation of 10 GHZ, find the effective wave length difference. <span style="float: right;">6M</span>  |
| 4 | a) Explain pump sources for Raman amplifiers. <span style="float: right;">6M</span><br>b) Consider the cros switch architecture, show that if $p \geq 2m - 1$ , the switch is strictly non blocking. <span style="float: right;">6M</span>  |
| 5 | a) Write short notes on <span style="float: right;">7M</span><br>i. Capacity limits of optical fiber<br>ii. Multilevel modulation<br>b) Consider a practical direct detection receiver derive the expression for variance $T^2 = T_{\text{Inot}}^2 + T_{\text{thermal}}^2 =$ <span style="float: right;">5M</span>  |
| 6 | a) Maximum efficiency of energy conversion from pump to signal is reached when every pump photon results in one signal photon due to stimulated emission. Assuming such a conditions, estimate the maximum efficiency of conversion for pump wavelength of 980nm and 1480 nm and signal wavelength of 150nm. <span style="float: right;">6M</span><br>b) Explain the dispersion limit in a design of a fiber optic communication systems. <span style="float: right;">6M</span>   |
| 7 | a) Show that the rms width of a Gaussian pulse whose half-width at the 1/e- intensity point is $T_0$ is given by $T_0 / \sqrt{2}$ <span style="float: right;">7M</span><br>b) Explain four-wave mixing in a WDM system. <span style="float: right;">5M</span>   |
| 8 | a) Consider the SNR of an APD receiver when both shot noise and thermal noise are present. Assuming that the excess noise factor of the APD is given by $F_A(G_m) = G_m^2$ for some $x \in (0,1)$ , derive an expression for the optimum value $G_m^{opt}$ of the APD gain $G_m$ that minimizes the SNR. <span style="float: right;">6M</span><br>b) Draw and explain WDM network elements. <span style="float: right;">6Ms</span>  |