VARDHAMAN COLLEGE OF ENGINEERING
## (AUTONOMOUS)
Two Year M. Tech I Semester Regular Examinations April - 2013
### (Regulations: VCE-R11)
DATA STRUCTURES AND ALGORITHMS
(Common to Computer Science and Engineering & 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

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1. a) Let a circular queue is maintained in an array $A[0....n-1]$. What is the size of the queue? Where F and R indicate the FRONT and REAR indices? **4M**

   b) Consider two binary operators '↑' and '↓' with the precedence of the operator ↓ being lower than that of the operator ↑. Operator ↑ is right associative while operator ↓ is left associative. Draw the parse tree for the expression: 7↓3↑4↑3↓2 **4M**

   c) Write a 'C' program to convert infix expression to postfix expression. **4M**

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**

   $$f_1(n) = 2^n \qquad f_2(n) = n^{3/2} \qquad f_3(n) = n\log_2 n \qquad f_4(n) = n^{\log_2 n}$$

   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) What is the average successful search time taken by binary search on a sorted array of 10 data items? **4M**

   b) Consider an array: {25, 14, 16, 13, 10, 8, 12} represents a binary max-heap. What is the content of the array after two delete operations on a binary max-heap? **4M**

   c) Consider the following balanced binary tree: **4M**
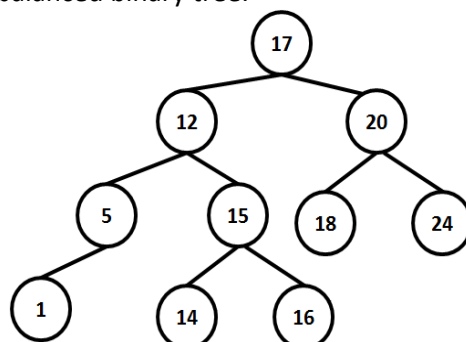
   i. Mark the balance factor of each node on the above tree and state whether it is height balanced or not.
   ii. Insert an integer 13 into the above tree and show the new tree with the new balance factors on each node.

5. a) What is a splay tree? Explain in detail its operations and applications.   6M

    b) The Keys 12, 18, 13, 2, 3, 23, 5 and 15 are inserted into an initially empty hash table of   6M
        length 10 using open addressing with hash function $h(k)=k$ mod 10 and linear
        probing. What is the resultant hash table?

6. a) A natural merge sort is to be used to sort the file of integers: 12, 37, 42, 9, 5, 7, 50, 40,   4M
        45, 92. What is order of the numbers after one pass of the sort?

    b) The elements 32, 15, 20, 30, 12, 25 and 16 are inserted one by one in the given order   4M
        into a Max-heap. What is the resultant Max-heap?

    c) A complete, undirected, weighted graph G is given on the vertex set {0, 1, 2, ...n-1} for   4M
        any fixed 'n'. Draw the minimum spanning tree of G if:

        i.   The weight of the edge (u,v) is $|u-v|$

        ii. The weight of the edge (u,v) is $u+v$

7. Consider the following directed graph. There are a multiple shortest paths between   12M
    vertices S and T. Which one will be reported by Dijkstra's shortest path algorithm? Write
    the sequence of vertices and cost of the shortest path from S to T. Assume that, in any
    iteration the shortest path to a vertex v is updated only when a strictly shorter path to v is
    discovered.
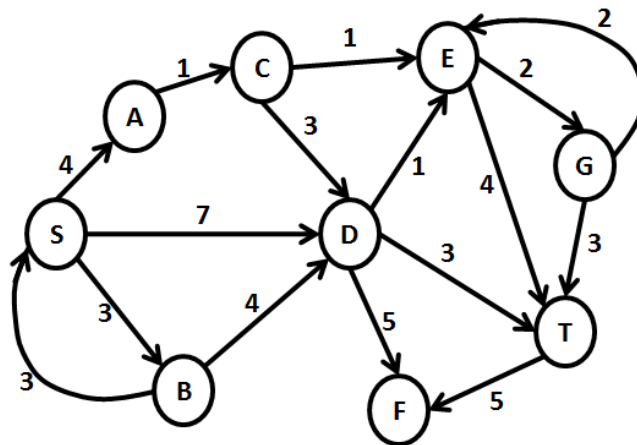
8. a) Consider an undirected graph with vertex set V = { n1, n2, n3, n4, n5, n6, n7, n8} and   6M
        edge set E = { (n1, n2), (n1, n3), (n1, n4), (n1, n7), (n2, n3), (n2, n4), (n2, n5),(n3, n5),
        (n3, n6), (n3, n7), (n4, n5), (n4, n7), (n5, n6), (n5, n7), (n5, n8),(n6, n8), (n7, n8)}. Find
        the chromatic number of this undirected graph.

    b) What is 8-queens problem? Give the solution for n-queens problem.   6M

VARDHAMAN COLLEGE OF ENGINEERING
(AUTONOMOUS)
Two Year M. Tech I Semester Regular Examinations April - 2013
(Regulations: VCE-R11)
ADAVANCED DATA COMMUNICATIONS
(Common to Digital Electronics and Communication Systems & 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

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1. a) For BPSK Modulator with a carrier frequency of 60 MHz and an input bit rate of 10Mbps determine the maximum and minimum lower side frequency. Draw the output Spectrum, determine the minimum nyquist bandwidth and calculate the baud.   4M

    b) Calculate the Shannon limit for information capacity, if signal to noise ratio is 30db and bandwidth of 2.7 KHz.   2M

    c) Explain the coherent demodulation of Frequency shift keying (FSK).   6M

2. a) Find the DPSK (Differential Phase shift Keyed) Modulated signal for the input bit stream 101110001101 . Using DPSK demodulator, reconstruct the signal from the modulated signal.   6M

    b) With the help of Constellation diagram explain Eight phase PSK (8PSK)   6M

3. a) Explain the five components of data communication.   4M

    b) Explain half Duplex and Full Duplex communication .Mention examples for each.   4M

    c) Discuss about Advantages and disadvantages of star topology.   4M

4. a) Describe 2 types of Wide Area Network.   4M

    b) List the standards organization for the data telecommunication.   4M

    c) Discuss about EIA interface standard.   4M

5. a) DRAW the NRZ-unipolar, RZ-unipolar, NRZ-polar, RZ- Polar and Manchester Line codes for the given bit stream 101110011.   5M

    b) Explain five methods commonly used for frame synchronization in TDM.   7M

6. a) Determine the transmitted data stream for the following data stream $G(x)$ and CRC generating Polynomial $P(x)$ 6M

    $$G(x) = x^7 + x^5 + x^4 + x^2 + x^1 + x^0$$
    $$P(x) = x^5 + x^4 + x^1 + x^0$$

    b) For a 12-bit data string of 101100010010 determine the number of hamming bits required, arbitrarily place the hamming bits into the data string, determine the condition of each hamming bit assuming the error occurring at bit positions 14 Prove that hamming code will detect the error.   6M

7. a) Explain IBM's Bisync Protocol.   6M

    b) Explain Stop and wait Protocol.   6M

8. a) Compare the Performance of circuit switching and Packet switching.   6M

    b) With the help of typical switched layout design explain public switched telephone network.   6M

VARDHAMAN COLLEGE OF ENGINEERING

(AUTONOMOUS)

Two Year M. Tech I Semester Regular Examinations April - 2013

(Regulations: VCE-R11)

ADVANCED DATA STRUCTURES AND ALGORITHMS

(Embedded 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

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1. a) Explain different linear data structure for inserting and deleting the elements. Discuss their applications.   6M
   b) How do you insert the data into and delete data from linked list without traversing the list? Write down the code for the same.   6M

2. a) Discuss the asymptotic notations. How does one measure the efficiency of the algorithm?   6M
   b) The time complexity of an algorithm can be measured using Aprioiri analysis or posteriori testing. Discuss these algorithms in detail?   6M

3. a) Discuss threaded binary tree. What are its applications and advantages and disadvantages over binary tree?   6M
   b) Write a code for a given graph , outputs   6M
      i. Vertices of each connected component,
      ii. Its cycle or a message that the graph is acyclic.

4. a) Construct AVL tree for the following numbers 14, 8, 12, 46, 23, 5, 77, 88, 20.   6M
   b) What is B-tree? How do you construct the B-tree? Explain with example.   6M

5. a) What is 2-3 tree? How is it better than other search trees? Construct a
      2-3 B tree for the list C, O, M, P, U, T, I, N, G.   8M
   b) What do you mean by hashing? Why do we need it?   4M

6. a) Write down the divide and conquer technique for multiplying two matrices. Derive its time complexity for total number of basic operations.   6M
   b) Write and explain Kruskal's algorithm for finding the minimum spanning tree. Also find the MST for the following graph.   6M
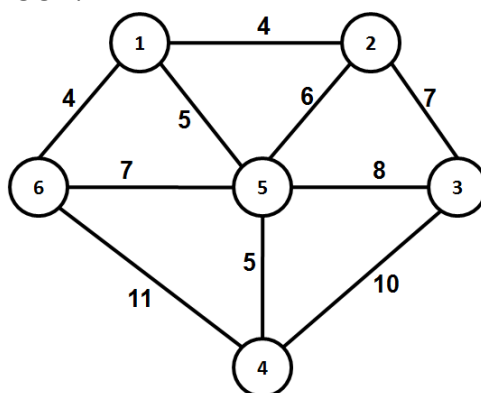
7. Solve the all pair shortest path problem for the digraph with the weight matrix. 12M

$$\begin{bmatrix} 0 & 2 & \infty & 1 & 8 \\ 6 & 0 & 3 & 2 & \infty \\ \infty & \infty & 0 & 4 & \infty \\ \infty & \infty & 2 & 0 & 3 \\ 3 & \infty & \infty & \infty & 0 \end{bmatrix}$$

8. a) Describe an efficient implementation for a LCBB travelling sales person algorithm using the reduced cost matrix approach? 6M

   b) Present a backtracking algorithm for solving the N-Queen's problem. Draw the portion of state space tree for the N-Queen's problem. 6M

VARDHAMAN COLLEGE OF ENGINEERING
(AUTONOMOUS)
Two Year M. Tech I Semester Regular Examinations April - 2013
(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
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1. a) Explain about different switching specifications of semi conductor devices and how you can choice the device depending on application.   6M

    b) The two diodes are connected in series as shown in the figure to share a total dc reverse voltage of V_D=5KV. The reverse leakage currents of two diodes are I_{s1}=30 mA and I_{s2}=35 mA.   6M

    i.   Find the diode voltages if the voltage sharing resistances are equal R_1=R_2=R=100 K Ω

    ii. Also write the spice model for the part(i)
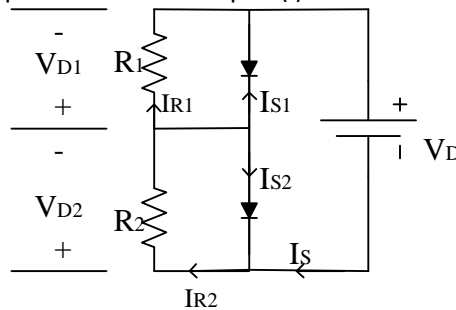
2. a) The waveforms of the BJT shown in the Figure below. The parameters are Vcc=250V, V_{BE-Sat}=3V, I_B=8A, V_{CS-Sat}=2V, I_{CS}=100A, t_d=0.5 μ sec, t_r=1 μ sec, t_s=5 μ sec, t_f =3 μ sec and f_S=10kHz. The duty cycle k=50%. The collector to emitter leakage current is I_{CEO}=3 mA. Determine the power loss due to collector current   6M

    i) During turn on $t_{on}= t_d + t_r$

    ii) During turn off period $t_{off} = t_s+t_f$
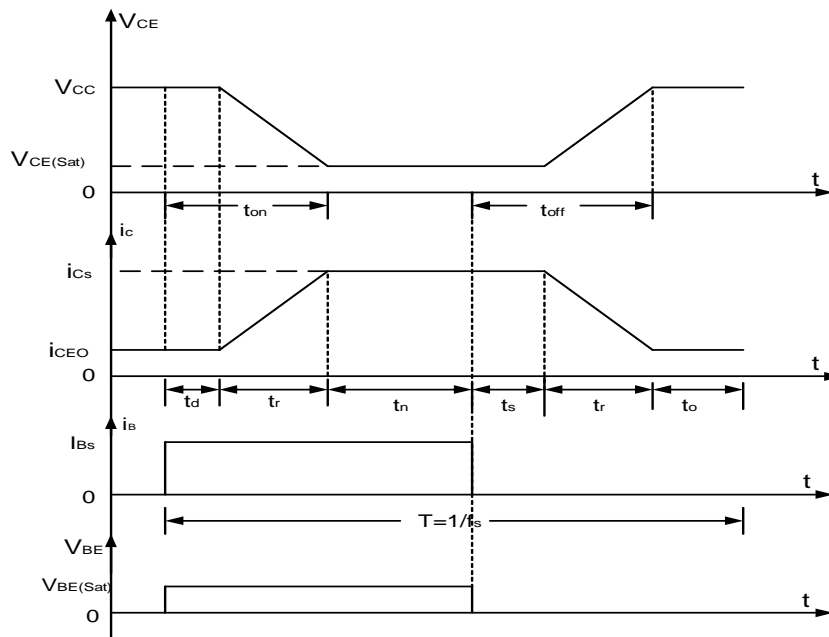
    b) Explain about transfer characteristics of MOSFET in   6M

    i) Depletion type

    ii) Enhancement type

3. a) Explain about IGBT spice model.   6M
    b) Explain about different turn on methods and turn off methods for the Thyristor.   6M

4. a) What is thermal management and explain about conduction and transition losses.   6M
    b) An air core inductance of 50 μH is made as wound strip of copper 40mm wide and   6M
       1.5mm thick. For cooling purpose, ½ mm spacing is used between each turn with an
       inner diameter of 60 mm and an outer diameter of 160mm as physical constraints. Is it
       possible to attain required inductance.

5. a) Derive the expression for diode connected series RL circuit and source voltage applied   6M
       is V_{DC} when the switch is closed at t=0 find the current value
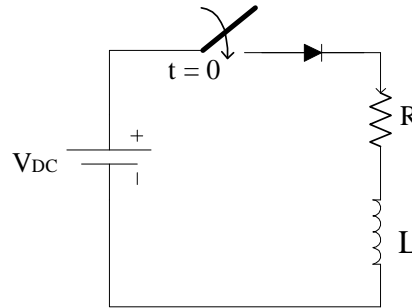

    b) Explain about device structure MOSFET and also explain about on/off transition loss   6M
       analysis.

6. a) Explain about transistor VI-characteristics and also give its spice model.   6M
    b) Explain about rating and specifications of IGBT and also about on/off transition loss.   6M

7. a) Explain about electrical equivalent circuit of thermal model and explain about effect of   6M
       temperature rise
    b) The input voltage of the figure is V_S=200V with load resistance of R=5 ohm. The load   6M
       and stray inductances are negligible and Thyristor is operated at a frequency of f_s = 2
       kHz. If the required dV/dt is 100 V/ μ sec and the discharge current is to be limited to
       100A. Determine
              i) The values of Rs and Cs
              ii) The Snubber loss
              iii) The power rating of the Snubber resistor
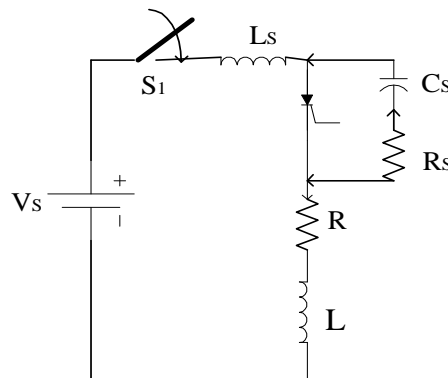
8. a) The reverse recovery time of a diode is t_{rr}=3 μ sec and the rate of fall of diode current is   6M
       30A/ μ sec. Determine a) storage charge Q_{rr} b)Peak reverse current I_{rr}.
    b) Explain about two transistor model of Thyristor and also give its spice model of   6M
       Thyristor.

VARDHAMAN COLLEGE OF ENGINEERING
(AUTONOMOUS)
Two Year M. Tech I Semester Regular Examinations April - 2013
(Regulations: VCE-R11)
APPLIED MATHEMATICS
(Engineering Design)

Time: 3 hours   **Max Marks: 60**

Answer any FIVE Questions. All Questions carry equal marks
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1. a) What is meant by absolute and relative errors? State conservative laws employed in any two major areas of engineering.   6M

    b) If $y = (0.31x + 2.73)/(x + 0.35)$ where the coefficients are rounded off, find the absolute and relative errors in y when $x = 0.5 \pm 0.1$.   6M

2. a) Discuss the convergence of Newton-Raphson method. What are the limitations of this method.   6M

    b) Use iteration method to obtain a root, correct to three decimal places, of $x \sin x - 1 = 0$.   6M

3. a) Compute the roots of the polynomial equation $x^3 + x + 10 = 0$ using Bairstow's method with starting values 1.8 and -4.0 .   6M

    b) Find the root of the equation $x^3 - 2x - 10 = 0$ which lies between 2 and 3 using Muller's method.   6M

4. a) Explain the trapezoidal rule geometrically. What is the error of this rule?   6M
    A wind force distributed against the side of a sky scraper is measured as follows:

Height (m):	0	30	60	90	120	150	180	210	240
Force: (N/m)	0	340	1200	1550	2700	3100	3200	3500	3750

    Compute the net force.

    b) Calculate the first and second derivatives of the function tabulated below at the point $x = 2.2$.   6M

x	1.0	1.2	1.4	1.6	1.8	2.0	2.2
y	2.7183	3.3201	4.0552	4.9530	6.0496	7.3891	9.0250

5. a) Solve the system of equations using triangularization method: 6M
    $3x + 2y + 7z = 4, 3x + 4y + z = 7, 2x + 3y + z = 5$.

    b) Find the inverse of the matrix using Gaussian elimination method: 6M

    $$\begin{bmatrix} 2 & 1 & 1 \\ 3 & 2 & 3 \\ 1 & 4 & 9 \end{bmatrix}$$

6. a) Determine the largest eigen value and the corresponding eigen vector of the matrix   6M

$$\begin{bmatrix} 1 & 3 & -1 \\ 3 & 2 & 4 \\ -1 & 4 & 10 \end{bmatrix}$$

   b) Using Givens method, obtain all the eigen values of the matrix   6M

$$\begin{bmatrix} 2 & -1 & 0 \\ -1 & 2 & -1 \\ 0 & -1 & 2 \end{bmatrix}$$

7. a) i) Let $T:R^2 \to R^3$ be a linear transformation given   6M
   by $T(x_1, x_2) = (2x^2 - x_1, 3x_2 - x_1, 2x_2 - 3x_1)$. Find x such that $T(x) = (-1, 4, 9)$.

   ii) Is the transformation $T(x_1, x_2, x_3, x_4) = (0, x_1 + x_2, x_2 + x_3, x_3 + x_4)$ from R^4 to R^4
   one-to-one? Justify your answer.

   b) The following data gives three ingredients in the diet together with the amount of   6M
   certain nutrients supplied by 100 grams (g) of each ingredient.

Nutrient	Amounts (g) supplied per 100 g of ingredient			Amounts (g) supplied by diet in one day
	Non-fat milk	Soya flour	Wheat flour	
Protein	36	51	13	33
Carbohydrates	52	34	74	45
Fat	0	7	1.1	3

   If possible, find some combination of non-fat milk, soya flour and wheat flour to
   provide the exact amounts of protein, carbohydrates and fat supplied in one day.

8. a) Distinguish between orthogonal set of vectors and orthonormal set of vectors in R^n.   6M
   Is the set of vectors $\left\{ \begin{pmatrix} 1 \\ 1 \end{pmatrix}, \begin{pmatrix} 1 \\ -1 \end{pmatrix} \right\}$ a basis of R^2? Is it orthogonal? Is it orthonormal? If
   not construct a orthonormal set from this one.

   b) Find the least squares solution of the equation   6M

$$AX = b \ for \ A = \begin{bmatrix} 1 & 1 & 0 \\ 1 & 1 & 0 \\ 1 & 0 & 1 \end{bmatrix} and \ b = \begin{bmatrix} 1 \\ 3 \\ 8 \end{bmatrix}$$

VARDHAMAN COLLEGE OF ENGINEERING
(AUTONOMOUS)
Two Year M. Tech I Semester Regular Examinations April - 2013
(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
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1. a) Show the following equations. 　　　　　　　　　　　　　　　　　　　6M
   i. $(P \rightarrow Q) \wedge (R \rightarrow Q) \Leftrightarrow (P \vee R) \rightarrow Q$
   ii. $\neg(P \quad Q) \Leftrightarrow (P \wedge \neg Q) \vee (\neg P \wedge Q)$

   b) Show that $(\forall x)(P(x) \vee Q(x)) \Rightarrow (\forall x)P(x) \vee (\exists x)Q(x)$ 　　　6M

2. a) Show that there are only five distinct Hasse's diagrams for partially ordered sets that contain three elements. 　　　　　　　　　6M

   b) Let $X = \{1, 2, 3\}$ and f, g, h and S be functions from X to X given by 　6M

   $f = \{<1,2>, <2,3>, <3,1>\} \quad g = \{<1,2>, <2,1>, <3,3>\}$

   $h = \{<1,1>, <2,2>, <3,1>\} \quad S = \{<1,1>, <2,2>, <3,3>\}$

   find $f \circ g; g \circ f; f \circ h \circ g; s \circ g; g \circ s; s \circ s$ and $f \circ s$.

3. a) Show the semigroup with more than one idempotent cannot be a group give an example of semigroup which is not a group. 　　　　　　　6M

   b) How many ways can we divide a deck of 52 cards into 2 halves if each half is to contain 2 kings. 　　　　　　　　　　　　　　　　　6M

4. a) Solve the recurrence relation $a_n = a_{n-1} + n3^n$ where $a_0 = 1$ by substitution. 　6M

   b) Solve the recurrence relation $a_n - 3a_{n-1} - 4a_{n-2} = 0$ for $n \geq 2$ and $a_0 = a_1 = 1$ using the characteristic roots. 　　　　　　6M

5. a) Construct DFA accepting the set of all strings over $\{a, b\}$ in which the number of occurrences of a is divisible by 4. 　　　　　4M

   b) For the following NFA with ε -moves convert it in to an NFA without ε –moves 　8M
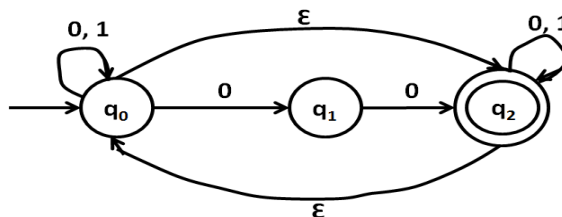
6. a) State and explain the closure properties of regular sets. 　　　　　5M
   b) Construct NFA for the following grammar 　　　　　　　　　　　　7M
   $S \rightarrow Ab / ab, A \rightarrow Ab / Bb, B \rightarrow Ba / a$

7. a) Construct the following CFG to CNF 　　　　　　　　　　　　　　7M
   $S \rightarrow ASB / \varepsilon, A \rightarrow aAS / a, B \rightarrow SbS / A / bb$
   b) State and explain the closure properties of context free grammar. 　5M

8. a) Design a Turing machine where the number of a's and number of b's are equal or the language is denoted as $L = \{w / n_a(w) = n_b(w)\}$ 　　8M

   b) Explain different types of Turing machines. 　　　　　　　　　　4M

VARDHAMAN COLLEGE OF ENGINEERING

(AUTONOMOUS)

Two Year M. Tech I Semester Regular Examinations April - 2013

(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
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1. a) What are the aims and principles of modeling?   3M
   b) Explain the conceptual model of the UML.   9M

2. a) A university offers degrees to students. The university consists of faculties each of   10M
      which consists of one or more departments. Each degree is administered by a single
      department. Each student is studying towards a single degree. Each degree requires
      one to 20 courses. A student registers in 1 – 5 courses (per term). A course can be
      graduate or undergraduate, but not both likewise a student can be graduate or
      undergraduate but not bot.
      Draw a class diagram which represents the generic objects and relationships described
      above. Make sure to specify the multiplicities of all associations in the diagram.
   b) The class diagram shown below represents employees in the organization. Propose   2M
      two improvements to the diagram. You need not draw another diagram.

EMPLOYEE
Emp#: Number
Manager: Employee
Manager#: Number
Assign: Project
………..
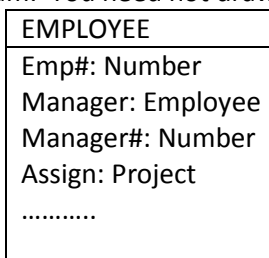
3. a) To buy a book electronically from chapters.com, a customer needs to select the book   4M
      from a list provided by chapter's ecommerce system, provide credit card information
      to the system, then the system gets authorization from the bank for payment, and if
      positive confirms the sale, the order is then sent to the orders department and when
      the book becomes available, it is shipped to the customer. Also, the orders
      department charges the customer's credit card by informing the bank of the amount.
      Draw a sequence diagram that models this process. Make sure to model all relevant
      actors and the interactions between them. Do show explicitly the time intervals when
      different actors actively participates in the process you are modeling.
   b) Draw a deployment diagram given that the modes are three client PCs, a server and a   8M
      printer. The communications protocol between the clients and the server is TCP/IP;
      and between the server and the printer is a standard parallel printer protocol. The use
      interface and the control objects will run on the clients.

4. a) A midterm exam is prepared by the instructor and taken by each of the students in the   6M
      class. In special cases where the student misses the test the student has to take the
      makeup test. Draw a use case diagram for this situation.
   b) Why should all the grand conditions from a state by mutually exclusive?   3M
   c) Against which other UML diagrams, should state chart be cross checked?   3M

5. a) Draw a deployment diagram to show how a web browser and a web server are located on different machines and the communication protocol they use.   6M

    b) What is the difference between "components" in a component diagram and "components" in a deployment diagram?   3M

    c) What is the difference between packaged diagram and a component diagram?   3M

6. a) Describe the five core workflows of the unified process.   6M

    b) Explain the differences between the workflows and the phases of the unified process.   6M

7. a) Describe the major risk categories during the inception phase.   6M

    b) How do you verify if the architecture is stable during the elaboration phase?   6M

8. a) How can you think of achieving useful version (alpha, beta and other test releases) as soon as possible during construction phase?   6M

    b) Synchronization and integration of concurrent development increments into one consistent deployment baseline. What are core activities that take in order to achieve this goal in transition phase?   6M

VARDHAMAN COLLEGE OF ENGINEERING
(AUTONOMOUS)
Two Year M. Tech I Semester Regular Examinations April - 2013
(Regulations: VCE-R11)
ADVANCED DIGITAL SIGNAL PROCESSING
(Common to Digital Electronics and Communication Systems & Wireless and Mobile Communications)

Time: 3 hours   **Max Marks: 60**

Answer any FIVE Questions. All Questions carry equal marks
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1. a) Design low pass Chebyshev filter using bilinear transformation method for satisfying the following constraints: 6M

    Pass band w_p : 0-400 Hz

    Stop band w_s : 2.1-4 KHz
    Pass band ripple   : 2 dB
    Stop band attenuation : 20 dB
    Sampling frequency   : 10 KHz
    Determine the difference equation representation of the digital filter

    b) Discuss the steps involved in the design of FIR filters using window based method. Also write explicitly the following window functions mathematically   6M
    Rectangular   ii. Bartlett   iii. Hamming   iv. Hannin

2. Design a linear phase FIR Filter that satisfies the following specifications based on a single stage and a two stage multirate structure   12M
    - Sampling rate : 10,000 Hz
    - Pass band : $0 \leq F \leq 60$
    - Transition band : $60 \leq F \leq 65$
    - Ripple : $\delta_1 = 10^{-1}, \delta_2 = 10^{-3}$

3. a) Discuss with block diagram oversampling of A/D converter and D/A converter.   6M
    b) Discuss with block diagram FDM to TDM transmultiplexer.   6M

4. a) Derive the relationships between the filter parameters and the autocorrelation sequence   6M
    b) Discuss with necessary equations The Levinson-Durbin algorithm.   6M

5. a) Write the relationships between the autocorrelation and the model parameters.   6M
    b) Discuss Yule-Walker method for the AR model parameters.   6M

6. Explain the following models for power spectrum estimation   12M
    a. MA model
    b. ARMA model

7. a) With relevant equations, discuss the filter design by the principle of orthogonality with respect to wiener filter.   8M
    b) Discuss the wiener Hopf equation with respect to wiener filter.   4M

8. With signal flow graph and relevant mathematical equations discuss the statement of the Kalmann filtering problem   12M

VARDHAMAN COLLEGE OF ENGINEERING
(AUTONOMOUS)
Two Year M. Tech I Semester Regular Examinations April - 2013
(Regulations: VCE-R11)
MICROCONTROLLERS FOR EMBEDDED SYSTEM DESIGN
(Embedded 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

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1. a) Compare microprocessor system with microcontroller system with a neat block   6M
        diagram and list those criteria to be considered while choosing microcontroller for an
        application.
    b) Explain steps and files involved in converting ASM language into Machine language   6M
        with a neat block diagram.

2. a) Explain 8051 CALL instructions with example code.   6M
    b) Different 8051 based systems designed with three different clock frequencies   6M
        11.0592 MHz, 16 MHz, 20 MHz Calculate time for each machine cycle.
        Find the time delay using the below subroutine for each of the above cases.
        Delay: Mov R2, #200
        Again: Mov R3, #250
        Here: NOP
                NOP
                DJNZ   R3, Here
        DJNZ   R2, Again
        RET

3. a) Describe 8051 memory structure and map internal memory structure with different   6M
        addressing modes.
    b) Write a program for the 8052 to put 55h into the upper RAM locations of 90 to 99h.   6M

4. a) Explain with an example packed and unpacked BCD in number system. Assume that   6M
        Reg A has packed BCD 29h, write a ASM program to convert packed BCD to TWO ASCII
        numbers and place them in R2 and R6.
    b) Write checksum program for the 4 bytes of hex data 25h, 62h, 3fh and 52h to be   6M
        transmitted by,
        i.   calculating and adding checksum byte in transmit packet
        ii. testing checksum Byte in received packet

5. a) For the given Truth table, how the final circuit developed using the combinational logic   6M
        design approach.
        Truth Table::   inputs   outputs

A	b	c	y	z
0	0	0	0	0
0	0	1	0	1
0	1	0	0	1
0	1	1	1	0
1	0	0	1	0
1	0	1	1	1
1	1	0	1	1
1	1	1	1	1

        Write
        i.   Output equations
        ii.   Minimized output equations
        iii. Final circuit

b) For the given Greatest Common Divisor GCD blackbox, 6M
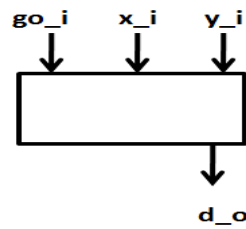
Write
  i. desired functionality flow
  ii. state diagram

6. a) Explain with a neat block diagram, the Software development process. 6M
   b) List different types of processors available and points to be considered in selecting the same for a given application. 6M

7. a) Write a comparison table while using General Purpose Processor Vs Single Purpose processor to design an embedded system. 6M
   b) What is Watch Dog Timer? Explain implementation of Timeout for an ATM using Watch Dog timer with block diagram and program. 6M

8. a) Explain memory hierarchy used in embedded system and what are the different types of memories used in embedded system design. 6M
   b) Explain RAM internals and Memory cell internals for 6M
      i. SRAM
      ii. DRAM

VARDHAMAN COLLEGE OF ENGINEERING
(AUTONOMOUS)
Two Year M. Tech I Semester Regular Examinations April - 2013
(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 the principle of rotating magnetic field.	4M
	b)	Sketch the power angle characteristics of non salient pole synchronous motor.	8M

2.   Draw the basic two pole machine diagrams and primitive machine diagrams for the   **12M**
     machines
   a) D.C shunt machine
   b) D.C compound machine
   c) 3-ph synchronous machine

3.   a) Explain the transient analysis of separately excited D.C motor.   **4M**
   b) A 230V, separately excited D.C motor is driving a constant load torque with the   **8M**
      following data R_a=0.4Ω, L_a=0.01H and R_f=115Ω. Motor torque constant Km=2
      Nm/armature amp. Friction and windage coefficient D=0; The armature current is 50A
      with the rated voltage across the armature and field. Determine the magnitude of
      constant load torque, if the armature voltage is suddenly reduced by 20V. Find the
      speed as a function of time. Assume J=12kgm^2.

4.   a) Define Linear Transformation.   **4M**
   b) Explain the phase transformation technique a,b,c to $\alpha,\beta,0$.   **8M**

5.   Write the voltage and current equations in stator reference frame of 3 phase induction   **12M**
     motor.

6.   Draw the basic circuit model for a 3-phase induction motor and express the voltage   **12M**
     equations in the matrix form using stator and rotor currents.

7.   Derive the dynamical equation of induction machine during normal operation. Hence   **12M**
     explain motor dynamics at
   a) Change in K with constant T_L
   b) change in T_L with constant K

8.   a) Derive the torque equation for a 3-phase synchronous motor.   **6M**
   b) Explain two axis representation of a synchronous machine.   **6M**

VARDHAMAN COLLEGE OF ENGINEERING

(AUTONOMOUS)

Two Year M. Tech I Semester Regular Examinations April - 2013

(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

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1. a) Realize 3-8 decoder using 2-4 decoder. Also draw the logic diagram.   6M
   b) By using logic diagram explain the operation of the 4-bit shift register.   6M

2. a) What are the basic functional units present in the computer and explain each of them?   6M
   b) By using the required parity generator/checker circuit, explain how parity checking can   6M
   be used for the error detection.

3. a) Let AR, BR, CR and DR the 8 bit registers with the following values. AR=11110010   6M
   BR=11111111 CR=10111011 DR=11101010. Determine the values of each register after
   execution of the sequence of micro-operations.
      i.   AR←AR+BR
      ii. AR←AR-CR
      iii. CR ← CR^DR, BR ← BR+1
   b) Explain with examples bus and memory transfers.   6M

4. a) Explain the operation of a carry look ahead adder.   6M
   b) Explain the booth's algorithm using an example. State how it reduces complexity.   6M

5. a) Explain the operation of a micro-programmed control unit.   6M
   b) Explain instruction pipelining with 5 operations and also show it improves   6M
   performance.

6. a) Explain the replacement algorithms used in cache memory.   6M
   b) Explain address – translation mechanism in virtual memories   6M

7. a) Using a flow chart explain the CPU I I/O channel communication   6M
   b) Compare the data transfer rates with reference to three kinds of I/O   6M

8. a) Explain arbitration schemes in multiprocessors.   6M
   b) Explain about synchronization in multiprocessors.   6M

VARDHAMAN COLLEGE OF ENGINEERING
(AUTONOMOUS)
Two Year M. Tech I Semester Regular Examinations April - 2013
(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

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1. a) Discuss in detail about good practices for requirements engineering.   8M
    b) Discuss the elements of software risk management.   4M

2. a) Discuss how risk is reduced through prototyping.   6M
    b) List out various software quality attributes.   6M

3. a) Discuss the need for requirements modeling.   4M
    b) Discuss about state transition diagrams and class diagrams with suitable examples. 8M

4. a) Discuss major requirements management activities?   8M
    b) List out requirement attributes for a large and complex projects.   4M

5. a) How the requirements management tools integrate with other kinds of software tools? 8M
       Explain with a neat diagram.
    b) Explain about Rational Requisite Pro.   4M

6. a) What are the components of software estimation? Discuss in detail.   6M
    b) Discuss the key project factors that influence estimation.   6M

7. a) Is size estimation a necessary factor in software process? If so explain. Discuss about 8M
       function point analysis.
    b) List out the disadvantages of function points.   4M

8. a) Explain the desirable features in software estimation tools. Write about COCOMO II. 6M
    b) Explain about Software Life Cycle Management (SLCM)   6M

VARDHAMAN COLLEGE OF ENGINEERING
(AUTONOMOUS)
Two Year M. Tech I Semester Regular Examinations April - 2013
(Regulations: VCE-R11)
DIGITAL SYSTEM 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

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1. a) Find a circuit that has no static hazards and implements the Boolean function   6M
        $$F(A, B, C, D) = \sum (0, 2, 6, 7, 8, 10, 12)$$
    b) Using Karnaugh maps, find a minimal sum-of products expression for the following   6M
        logic functions and indicate the distinguished 1-cells in each map.
        i. $F = \sum A, B, C(0, 1, 2, 4)$
        ii. $F = \sum W, X, Y, Z(1, 4, 5, 6, 11, 12, 13, 14)$

2. a) For a combinational circuit, explain following with the help of timing diagram.   6M
        i.   Propagation delay
        ii. Minimum delay
        iii. Maximum delay
        iv. Maximum operating frequency
    b) Realize full-adder using 3-8 line decoder and two NOR gates.   6M

3. a) Design 8-bit priority encoder using PAL20L8 PLD device.   6M
    b) With the help of neat block diagram, explain working of iterative n-bit comparator.   6M

4. a) With necessary timing diagram, state machine and state table, explain steps for   6M
        analyzing clocked synchronous state machines.
    b) Explain various timing issues in digital system design with the help of neat diagrams. 6M

5. a) Explain setup and hold time violations in digital design. Describe how these violations 6M
        can be avoided.
    b) What are the components of State machine chart? Explain with an example.   6M

6. a) Write SM chart for dice game describing all the rules of the game.   6M
    b) With an example, explain the fault equivalence and fault dominance.   6M

7. a) Explain the need of logical fault models in digital circuit testing. Discuss in detail, the 6M
        single stuck-at fault models and bridging fault models.
    b) What is the significance of Fault collapsing? Explain the fault collapsing in EX-OR circuit. 6M

8. a) With the help of an example, explain PODEM algorithm.   6M
    b) Consider the function $f = a + ((bc)(d + e)')'$. Find the test vectors that detect stuck- 6M
        at-o and stuck-at-1 fault at 'a' using Boolean difference algorithm.

VARDHAMAN COLLEGE OF ENGINEERING
(AUTONOMOUS)
Two Year M. Tech I Semester Regular Examinations April - 2013
(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

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1. a) Explain the working of Touch Tone Dial Telephone.   6M
   b) Write short notes on Evolution of Telecommunication.   6M

2. a) Explain Software Architecture of SPC.   6M
   b) Explain in detail about Centralized SPC.   6M

3. a) With neat block diagram explain Time Multiplexed Space Switching.   6M
   b) Explain 3-Stage Combination Switching.   6M

4. a) Write short notes on Charging Plan.   6M
   b) Explain Switching Hierarchy and Routing.   6M

5. a) State the principles in Common Channel Signaling and Explain.   6M
   b) Explain the CCITT Signaling System no.7 with necessary diagrams.   6M

6. a) Explain the use of expansion in Switching networks.   6M
   b) Write short notes on Wide area networks.   6M

7. a) Explain the lost call systems in the aspect of telecommunications traffic. 6M
   b) A group of 20 servers carry traffic 10 erlangs. If the average duration of a call is   6M
      3 minute. Calculate the number of calls put through by a single server and the group
      as a whole in a one hour period and the traffic intensity.

8. a) How The services of Integrated Services Digital Networks are used in Teletex.   6M
   b) Write short notes on Broadband Integrated Services Digital Networks.   6M

VARDHAMAN COLLEGE OF ENGINEERING
(AUTONOMOUS)
Two Year M. Tech I Semester Regular Examinations April - 2013
(Regulations: VCE-R11)
EMBEDDED REAL TIME OPERATING SYSTEMS
(Embedded 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

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1. What is binary semaphore? With an example explain how to use binary semaphores for signaling or notifying occurrences of an event from a task or thread and for signaling or notifying another task waiting for that event.   12M

2. a) Illustrate three examples for specifying hard timing constraints   4M
   b) Define   8M
      i.   Soft Real Time Systems
      ii. Validation
      iii. Statistical constraints
      iv. Hard Real Time Systems

3. Prove the theorem with figures : When preemption is allowed and jobs do not contend for resources , the EDF algorithm can produce a feasible schedule a set of jobs J with arbitrary release times and deadlines on a processor if and only if J has feasible schedules.   12M

4. a) Differentiate process and thread.   2M
   b) Define task and explain with diagram all the five states of a task.   10M

5. Define the table for kernel services in an operating system with functions and actions.   12M

6. a) Explain the creation and activation of a task by task spawn function in VxWorks.   3M
   b) For task priority function, Define 3 options on spawning.   9M

7. a) Illustrate the block diagram of Automatic Chocolate Vending Machine System(ACVM). 6M
   b) Explain all the specifications of Hardware architecture of ACVM system.   6M

8. a) Draw and explain the architecture for Air Traffic Control(ATC).   10M
   b) Illustrate two examples for RTOS Image Processing.   2M

VARDHAMAN COLLEGE OF ENGINEERING
(AUTONOMOUS)
Two Year M. Tech I Semester Regular Examinations April - 2013
(Regulations: VCE-R11)
POWER ELECTRONIC CONVERTERS-I
(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

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1. Explain the operation of single-phase AC voltage controller with R and R-L loads and draw load voltage, load current and thyristor voltage waveforms for $\alpha=45^0$?   12M

2. a) A three phase star connected balanced resistances are supplied from a three-phase ac voltage controller. Derive the expression for rms value of load current in the complete range of firing angles. Draw the waveforms of load current.   9M

    b) A three-phase ac voltage controller feeds a balanced star connected R-L load. The value of resistance is 5Ω and inductance is 7.5mH. The controller is fed from a 3-phase supply of 400V, 50Hz. Determine the following for a firing angle of 90^0 4M
        i.   rms load current
        ii. rms load voltage

3. a) What is Matrix converter? Explain in detail.   6M
    b) Explain the operation three-phase to three-phase cycloconverter (6-puse) with relevant circuit diagram and wave forms?   6M

4. What are the various power factor improvement methods in phase controlled rectifiers? Discuss in detail with relevant waveforms.   12M

5. a) A 3 phase full converter charges a battery from a three phase supply of 230V, 50Hz. The battery emf is 200V and its internal resistance is 0.5Ω. On account of inductance connected in series with the battery, charging current is constant at 20A (continuous conduction). Compute firing angle and the supply power factor.   6M
    b) Explain the operation of 12-puse converter with relevant waveforms.   6M

6. a) Explain the operation of a boost regulator assuming continuous conduction mode.   6M
    b) The buck regulator has input voltage of V_S = 12V. The required average output voltage is V_a=5V at R=500Ω. Peak to peak output voltage ripple is 20mV. Switching frequency is 25 KHz. If peak to peak ripple current of inductor is limited to 0.8A. Find   6M
        i.   duty cycle
        ii. filter inductance L &C

7. Explain briefly the following modulation techniques with relative advantages and disadvantages.   12M
        i.   Single PWM
        ii.   Multiple PWM
        iii. Sine PWM
        iv.   Staircase
        v.   Third Harmonic Injection
        vi.   Stepped

8. a) Explain briefly 120^0 conduction mode operation of three phase inverter.   6M
    b) Explain the operation of boost inverter.   6M

VARDHAMAN COLLEGE OF ENGINEERING
(AUTONOMOUS)
Two Year M. Tech I Semester Regular Examinations April - 2013
(Regulations: VCE-R11)
ADVANCED MECHANISMS
(Engineering Design)

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 mobility criterion for planar mechanisms and enumerate its limitation.	6M
	b)	What are the specific advantages of spherical mechanisms over other spatial and planar mechanisms?	6M

2.	a)	Explain term collineation axis and its use for finding inflection points.	3M
	b)	Show the Biobiller construction described with reference to the four bar mechanism shown in Figure.1, satisfies the Euler-Savory equation.	9M

B

30°

60°

$O_A A = 20mm$
$AB = 18mm$
$O_B B = 25mm$

O_A

A

O_B
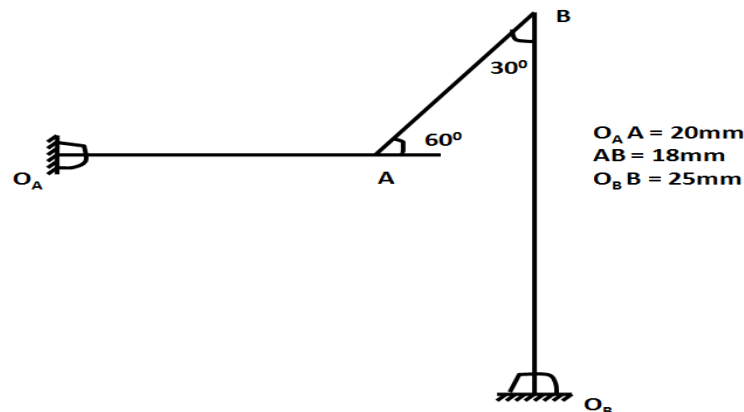
Figure.1

3.	a)	State and prove Carter hall circle theorem.	6M
	b)	State and derive Halls equation.	6M

4.	a)	What is rotocenter triangle?	3M
	b)	Explain in detail how Burmester's curve will be drawn for a four bar mechanism.	9M

5.	Mechanize the function $Y = \log_{10} X$ in the interval. $1 \le x \le 10$, with the range is divided into six intervals and use overlay method.	12M

6.	Design and draw a four bar mechanism, such that the crank angles required will be co-ordinates as follows:	12M

φ   0   30   60
ψ   20   45   85

7.		For the SCARA type robot	
	a)	Assign coordinates frames based on D-H representation.	4M
	b)	Fill out the parameter table.	4M
	c)	Write all matrices.	

8.		Write short notes on any three of the following:	12M
	a)	Formulation of Jocobian for planar manipulator.	
	b)	Singularity analysis.	
	c)	D-H notation.	
	d)	Link co-ordinates system for a PUMA robot with neat sketch.	

VARDHAMAN COLLEGE OF ENGINEERING
(AUTONOMOUS)
Two Year M. Tech I Semester Regular Examinations April - 2013
(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) Why is it important to understand the customer's problem before creating a software solution?   4M
    b) Explain briefly any three process flow models with neat diagram for each.   8M

2. a) What is incremental process model? Give an example and also state when this process model is useful.   6M
    b) Explain briefly industrial extreme programming.   6M

3. a) Identify functional and non functional requirements for automation of ATM.   6M
    b) Explain briefly Class Responsibility Collaborator model with an example.   6M

4. a) With a neat diagram, explain briefly the instantiation of security function of Safe Home system with component elaboration.   6M
    b) Illustrate with a suitable example class based component design.   6M

5. a) What is a framework and idiom? How do they differ from a pattern?   6M
    b) Assume that you have been asked to develop a billing system for Mantri Sqaure Mall. Identify and explain briefly any three user interface design issues involved with the given system.   6M

6. a) Explain briefly alpha, beta and customer acceptance testing.   6M
    b) According to Tom Gilb, what guidelines lead to a successful software testing strategy?   6M

7. a) Explain briefly condition and data flow testing with respect to control structure testing   6M
    b) Describe the concept of partition testing at class level with a suitable example.   6M

8. a) With respect to software reengineering explain   6M
        i) Inventory analysis
        ii) Forward engineering
    b) Explain briefly metrics for source code.   6M

VARDHAMAN COLLEGE OF ENGINEERING
(AUTONOMOUS)
Two Year M. Tech I Semester Regular Examinations April - 2013
(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

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1. a) Describe the Repeatable and Defined levels of Process Maturity.   6M
    b) What are the basic principles of Software Process change?   6M

2. a) Differentiate between CMM and PCMM.   6M
    b) What are the different Process Reference Models? Write the significance of PSP.   6M

3. a) What are the attributes of a good software cost estimate?   6M
    b) How is Waterfall model used in software development?   6M

4. a) Which phase of the four phases of software life cycle is the most critical? Explain why?   6M
    b) What are the primary objectives and essential activities of the Transition phase?   6M

5. a) What are the fundamental flaws in Conventional Work Breakdown Structures? Write   6M
       the solution to overcome these flaws.
    b) Explain the characteristics of the milestone occurring at the end of Construction phase.   6M

6. a) List the Software Development Team activities and responsibilities.   6M
    b) Write about the categories of changes in a software.   6M

7. a) Write the quality indicators used for managing a software process.   4M
    b) Describe the basic operational concept for an SPCP, using a top level Use case view   8M
       corresponding to interaction between a monitor and the control panel.

8. Describe the Incremental Design Process used in the CCPDS-R Case Study.   12M

VARDHAMAN COLLEGE OF ENGINEERING
(AUTONOMOUS)
Two Year M. Tech I Semester Regular Examinations April - 2013
(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

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1. a) Does the thickness and dimensions of aluminum as a gate in MOS Transistor pose a   6M
        problem in conduction from parasitic resistance/capacitance viewpoint? Discuss your
        answer.
    b) Draw a neat schematic diagram of small signal model for a MOS transistor in the active   6M
        region, derive and show that $V_{eff} = \sqrt{\dfrac{2I_D}{\mu_n C_{ox}\left(\dfrac{W}{L}\right)}}$ and $g_m = \dfrac{2I_D}{V_{eff}}$.

2. a) Draw a cross section of an n-channel MOS Transistor showing the small-signal   6M
        capacitances.
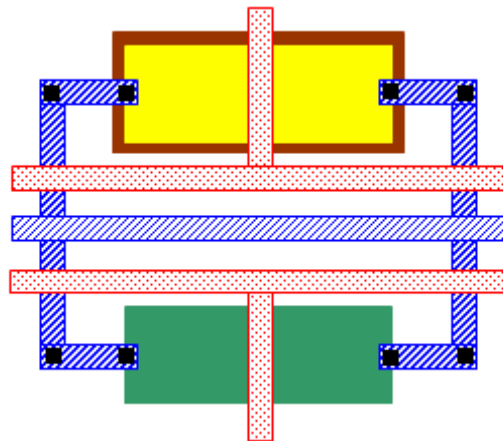   b) Draw the equivalent circuit of the following figure .1 layout?   6M

Figure.1

3. a) Realize the EX-OR function using Transmission Logic Gates with minimum number of   6M
        MOSFETS.
    b) An n-channel transistor is modeled as having the following capacitance parameters: 6M
        $C_j = 2\times10^{-4}\, pF / \mu m, \; C_{ox} = 1.9\times10^{-3}\, pF / \mu m^2$ and

        $C_{gs-0V} = C_{gd-0V} = 2\times10^{-4}\, pF / \mu m$.

        Find the capacitances C_{gs}, C_{gd}, C_{db} and C_{sb} for an active transistor having W=100μm
        and L = 2μm. Assume the source drain junction extended 4 μm beyond the gate, so
        that the source and drain areas are $A_s = A_d = 400 \mu m^2$ and the perimeter of each is
        $P_s = P_d = 108 \mu m$.

4. a) Describe complex logic functions?   4M
    b) Draw transmission logic based 1-bit full adder device level circuit diagram and explain   8M
        its operation.

5. a) Draw a basic 8-T RAM cell and explain its operation.   6M
    b) With the help of neat schematic diagram explain charge injection.   6M

6. a) Draw a neat diagram of charge pump circuit and explain its operation. 6M

   b) Design a CMOS Domino Logic that implements the following function 6M
   $F = \overline{A(B+C)+DE}$ and briefly explain the circuit operation.

7. The simplified layout of a CMOS logic circuit is given below in figure 2. Draw the 12M corresponding circuit diagram, and find Boolean function realized by the circuit.
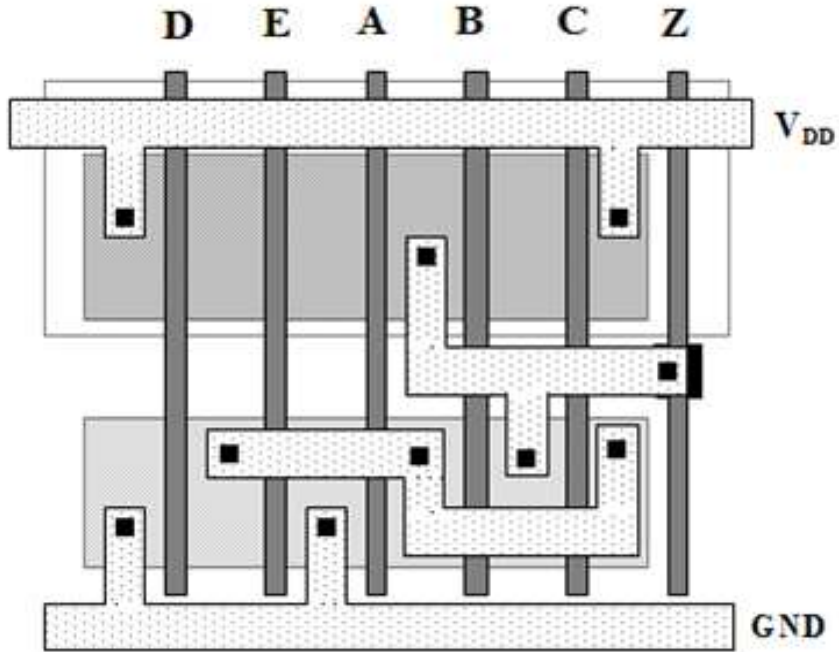

Figure.2

8. a) What are the advantages of Differential Split-Level (DSL) CMOS Logic? 4M

   b) Design a Cascode Voltage Switch Logic (CVSL) network that implements the function 8M
   $F = \overline{AB+CD}$ and explain its operation.

VARDHAMAN COLLEGE OF ENGINEERING
(AUTONOMOUS)
Two Year M. Tech I Semester Regular Examinations April - 2013
(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) Compare connectionless and connection oriented switching.   6M
   b) Explain the TCP/IP Protocol suite with a neat diagram.   6M

2. a) An organization is granted the block of address 130.34.12.64/26. The organization   6M
      needs to have four subnets where the first subnet has 30 hosts, second subnet has 10
      hosts and the third and fourth subnets need only four addresses. Design the network
      and give the range of address in each of the subnets.
   b) Explain the working of RARP with its packet format.   6M

3. a) Explain the IPv4 datagram header with explanation of each field.   6M
   b) Explain the connection establishment, data transfer and connection termination   6M
      processes with TCP.

4. a) Discuss the different services offered by SCTP.   6M
   b) Explain the Distance Vector routing with the help of RIP updating algorithm.   6M

5. a) Define Multicasting. Explain any three applications of Multicast routing.   4M
   b) Discuss in detail the DVMRP protocol.   8M

6. a) What are the different types of DNS messages? Explain with its header format.   6M
   b) What is FTP? What are the different types of connections used in FTP? Explain the   6M
      communication process used in FTP.

7. a) Write a note on UA and MTA.   4M
   b) Why Mobile IP is required? Explain the communication process in Mobile IP.   8M

8. a) Explain different approaches for streaming stored Audio/Video.   6M
   b) Explain RTP with its packet header.   6M

VARDHAMAN COLLEGE OF ENGINEERING
(AUTONOMOUS)
Two Year M. Tech I Semester Regular Examinations April - 2013
(Regulations: VCE-R11)
DSP PROCESSORS AND ARCHITECTURES
(Embedded 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)	Compare Direct DFT & FFT in terms complex multiplications, additions and speed improvement factor for N=8.	6M
	b)	Compute DFT for x(n) = {1,1,1,1} using radix-2 FFT algorithm.	6M
2.	a)	Explain D/A conversion errors with neat sketches.	8M
	b)	Find the decimal equivalent of the floating-point binary number 1100111011100. Assume a format similar to IEEE-754 in which the MSB is the sign bit followed by 4 exponent bits followed by 8 bits for the fractional part.	4M
3.	a)	Explain the MAC unit with overflow / underflow management techniques.	6M
	b)	A barrel shifter is to be designed with 16 inputs for left shifts from 0 to 15 bits. How many control lines are required to implement the shifter and show the implementation diagram.	6M
4.	a)	Explain the branching effects.	4M
	b)	Explain Hardware looping.	4M
	c)	Describe interrupts.	4M
5.	a)	Draw the block diagram of the circular addressing mode for TMS320C54XX processors & explain its operation with example.	6M
	b)	Explain the CPU of TMS320C54XX processor with block diagram.	6M
6.	a)	Explain the Q-notation.	2M
	b)	Represent each of the following as 16-bit numbers in the desired Q-notation. i) 0.3125 as a Q15 number ii) -0.3125 as a Q15 number	4M
	c)	Write a program to implement the IIR filter represented by the following difference equation on TMS320C54XX, Where Q15 is used to represent the values to coefficients and Q0 to represent the signal samples. Y(n) = h(N-1) x(n-(N-1) + ……….. + h(1) x(n-1) + h(0) x(0).	6M
7.	a)	Explain overflow and scaling.	4M
	b)	Implement an 8-point DIT – FFT on the TMS320C54XX with the help of program.	8M
8.	a)	Explain the memory space organization in TMS320C54XX processor.	8M
	b)	Design an interface to connect a 64K x 16 flash memory to a TMS 320C54XX device. The processor address bus is A0 – A15.	4M

VARDHAMAN COLLEGE OF ENGINEERING
(AUTONOMOUS)
Two Year M. Tech I Semester Regular Examinations April - 2013
(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 motor current, current Imax and I min and average torque for chopper-fed dc separately excited motor. 6M

    b) A dc chopper controls the speed of a separately excited dc motor. The armature resistance is Ra=0.05. The back emf constant is Kv=1.527v/A-rad/s. The rated field current is If = 2.5A. The dc input voltage to the chopper is Vs= 600v. If it is required to maintain a constant developed torque of Td = 547N-m, plot the motor speed against the duty cycle k of the chopper. 6M

2. a) What is a dual converter? Explain the principle of operation of a dual converter in circulating current mode. How the same is used for speed control of dc drive. 6M

    b) A 230v separately excited dc motor takes 50A at a speed of 800rpm. It has armature resistance of 0.4. This motor is controlled by a chopper with an input voltage of 230v and frequency of 500Hz. Assuming continuous condition throughout, calculate and plot speed-torque characteristics for: 6M

     i. Motoring operation at duty ratios of 0.3 and 0.6.
     ii. Regenerative braking operation at duty ratios of 0.7 and 0.4.

3. Describe the relative merits and demerits of the following types of braking for dc motors: mechanical braking, dynamic braking and regenerative braking with neat diagram. 12M

4. Explain the Speed torque Characteristics of a dc series motor connected to a three phase fully controlled converter. 12M

5. a) Draw and explain the block diagram of 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) A DC shunt motor operating from a 1-ϕ half controlled bridge at a speed of 1450 rpm has an input voltage 330 Sin 314t and a back emf 75V. The SCRs are fired symmetrically at α = Π/3 in every half cycle and the armature has a resistance of 5Ω. Neglecting armature inductance, find the average armature current and the torque. 6M

    b) Sketch the speed-torque characteristics for the above problem. 6M

7. Draw and explain the power circuit diagram of 1-ϕ semi-converter feeding a separately excited D.C motor. Explain with typical voltage and current waveforms, the operation in continuous armature current Mode 12M

8. A 100kw 500V 2000-rpm separately excited dc motor is controlled by a three-phase fully controlled converter and is fed from a 400V 50 Hz supply. The voltage drop in conducting thyristor is 2V. Motor parameters are Ra=0.1 Ohm, La=8mH,Km=1.6.Rated armature current = 210A.No load current is 10% of rated current. 12M
     (a) Find no load speed at firing angle of 30^0
     (b) Find the firing angle to obtain 2000rpm at rated armature current. Also find supply power factor.
     (c) Find the speed regulation for the firing angle obtained in part b.

VARDHAMAN COLLEGE OF ENGINEERING
(AUTONOMOUS)
Two Year M. Tech I Semester Regular Examinations April - 2013
(Regulations: VCE-R11)
FINITE ELEMENT METHODS
(Engineering Design)

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

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1. a) Explain Raleigh Ritz Method, with example.   6M
    b) Explain the discretization process in FEM, taking structural domain examples.   6M

2. For the stepped bar subjected to an axial load of 200 KN, as shown in Figure.1,   determine
    the following: 12M
    i.   The nodal displacements
    ii. The support reactions
    iii. The stress in each material

Figure.1

3. a) Describe the penalty approach for handling boundary conditions, while solving   6M
        equilibrium equations, in static analysis using FEM.
    b) Explain the mathematical process for obtaining the stiffness matrix of a linear   6M
        two dimensional (planar) truss element in global coordinate system, from
        the stiffness of a bar in local coordinate system.

4. a) Descretize the beam shown in Figure. 2, with minimum number of beam elements and   6
        write down   M
        i.   The nodal load vector using consistent equivalent load for the uniformly
             distributed load and
        ii. The boundary conditions

Figure.2

    b) Derive the transverse displacement function of a beam element, in terms of its   6
        nodal degrees of freedom.   M

5. a) Write down the governing differential equation and boundary conditions for the two dimensional steady state heat transfer problem.   4M

    b) Compute the element stiffness matrices and load vectors for the CST element shown in Figure. 3.   8M

$$\lambda = 10W / cm^2 \, {}^0k$$
$$T\infty = 40^0 c$$

$$\lambda = 15W / cm^2 \, {}^0k$$
$$T\infty = 40^0 c$$

$$K = 60W / cm {}^0k$$
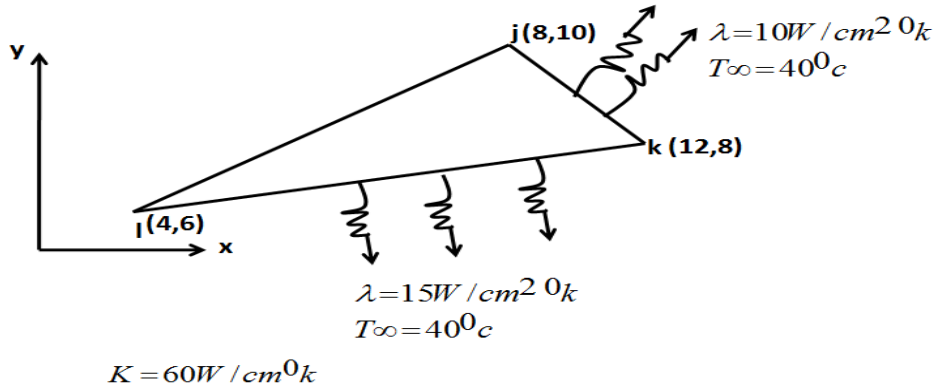
Figure.3

6. a) Distinguish between iso-parametric, sub-parametric and super-parametric elements.   4M

    b) Explain what is a Jacobian matrix.   4M

    c) Evaluate the integral of the function $f(x) = [3e^x + x^2 + 1/(x+2)]$ between the limits -1 and +1, using (i) one-point and (ii) two-point Gauss quadrature.   4M

Gauss points, n	Location, ξ	Weight, w
1	0.0	2.0
2	± 1/ √3	1.0

7. a) What is the difference between lumped mass and consistent mass? Explain their relative merits in practical applications.   4M

    b) Find the natural frequencies corresponding to the lateral vibration of a uniform beam of length L and bending rigidity EI and mass density ρ, if it is simply supported at both ends. Use single beam element and consistent mass matrix for the solution.   8M

8. a) Explain what is meant by H and P formulation. What are their advantages and disadvantages, while employing them in solving large size problems?   5M

   b) Explain the requirements for the convergence of Finite Element solution to the exact one.   7M

VARDHAMAN COLLEGE OF ENGINEERING
(AUTONOMOUS)
Two Year M. Tech I Semester Regular Examinations April - 2013
(Regulations: VCE-R11)
DIGITAL IMAGE PROCESSING AND PATTERN RECOGNITION
(Common to Computer Science and Engineering & 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

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1. a) Images of size 1000 x 1000 pixels/frame and encoded to 8 bits/pixel are transmitted   2M
        after compression with a compression ratio of 4. The transmission is at 25
        frames/second. Find the bit rate of transmission. (bits per second).
    b) Explain uniform and non-uniform type of   10M
        i)   Sampling
        ii) Quantization

2. a) Obtain the DCT matrix for the order N=4, mention the applications of the same   6M
    b) Briefly describe the following properties of DFT.   6M
        i)   Separability
        ii)   Convolution
        iii) Spatial correlation

3. a) Explain the homomorphic filtering approach for image enhancement. What are its   6M
        advantages?
    b) An image has the grey level PDF $p_r(r)$ shown in the following diagram. It is desired to   6M
        transform the grey levels of this image so that they will have the specified $p_z(z)$ shown.
        Assume continuous quantities and find the transform in terms of r & z that will
        accomplish this.
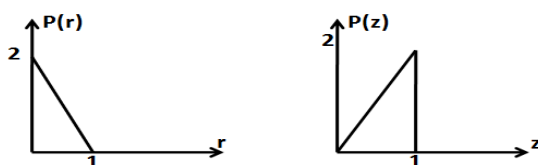
Figure.1

4. a) Obtain the degradation model for continuous functions.   6M
    b) Explain the constrained least squares method for image restoration.   6M

5. a) A binary image contains straight line oriented horizontally, vertically, at 45^0, and at -   6M
        45^0. Give a set of 3 x 3 masks that can be used to detect 1-pixel-long breaks in these
        lines. Assume that the grey level of the lines is 1 and that of the background is 0.
    b) Explain, with the help of a suitable example, edge linking and boundary detection   6M
        using graph theoretic techniques.

6. a) Find Huffman coding (variables length optimum coding) for the following to get   8M
        minimum average length

        Symbol   Probability
          a2   0.4
          a3   0.3
          al   0.15
          a4   0.15
    b) The base e unit of information is commonly called a *nat* and the base 10 information   4M
        unit is called a *Hartley*. Compute the conversion factors needed to relate these units to
        the base 2 unit of information (the bit)

7. a) What is a discriminant function? In a two-class problem, the likelihood ratio is   8M
        Given as follows: $p(x|C_1)/p(x|C_2)$. Write the discriminate function in terms of the
        likelihood ratio.

    b) In a two-class , two-dimensional classification task the feature vectors are generated   4M
        by two normal distributions sharing the same covariance matrix
        $$\Sigma = \begin{matrix} 1.1 & 0.3 \\ 0.3 & 1.9 \end{matrix}$$
        And the mean vectors are $\mu_1 = [0,0]^T$, $\mu_2 = [3,3]^T$ respectively.
        Classify the vector $[1.0, 2.2]^T$ according to the Bayesian classifier.

8. a) Explain maximum likelihood parameter estimation method and its properties.   6M
    b) Explain the general theory of Bayesian parameter estimation. When do maximum-   6M
        constrained & Bayes method differ?

VARDHAMAN COLLEGE OF ENGINEERING
(AUTONOMOUS)
Two Year M. Tech I Semester Supplementary Examinations April - 2013
(Regulations: VCE-R11)
ARTIFICIAL INTELLIGENCE AND NEURAL NETWORKS
(Common to Computer Science and Engineering & 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

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1. a) What is an Artificial Intelligence technique? Explain Tic-Tac-Toe problem using   10M
        Artificial intelligence techniques.
    b) Define resolution principle.   2M

2. a) Explain with an example how set theory provides a good basis for understanding   6M
        frame system.
    b) Differentiate fleeting and non fleeting scripts.   6M

3. What are the several components of Natural Languages understanding process? Explain in 12M
    detail.

4. a) What are the features of Artificial Intelligence programming language PROLOG?   6M
    b) Explain pattern recognition.   6M

5. a) Briefly explain different Neural Network Architectures.   6M
    b) Explain the capabilities of Neural Networks.   6M

6. a) Explain credit assignment problem.   2M
    b) Illustrate in detail about Memory based learning and Hebbian Learning.   10M

7. a) What is adaptive filtering problem for a dynamical system?   6M
    b) Explain least mean square algorithm.   6M

8. a) Explain back propagation and differentiation.   6M
    b) Explain the sufficient training set size for a valid generalization.   6M

VARDHAMAN COLLEGE OF ENGINEERING
(AUTONOMOUS)
Two Year M. Tech I Semester Regular Examinations April - 2013
(Regulations: VCE-R11)
MOBILE SATELLITE COMMUNICATIONS
(Common to Digital Electronics and Communication Systems & 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

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1. a) Define   4M
    i.   Look angle
    ii.   Subsatellite points
    iii. Orbit
    iv.   Uplink design
    v.   Argument of perigee

    b) Explain the main elements of satellite communication networks with neat block   4M
        diagram.

    c) Briefly explain about Geo stationary satellite systems.   4M

2. a) What is Doppler effect? Show that $f_d = \frac{2V_t}{\lambda}$.   4M

    b) What is meant by eclipse on satellites? Discuss eclipse geometry dates and duration of   5M
        eclipses.

    c) What is sun-transit outage?   3M

3. a) Explain about considerations in inclined orbit constellations, hybrid constellations.   6M

    b) Discuss the optimization technique to ensure minimum elevation angle within   6M
        coverage area.

4. a) Briefly explain various frequency bands used for satellite communications and   7M
        frequency allocations for mobile satellite service.

    b) Explain spectrum forecast methodology.   5M

5. a) With neat block diagram, explain the main entities of a large earth station.   6M
    b) Write short notes on   6M
          (i) Vehicle mounted terminal
          (ii) Mobile terminal antennas

6. a) Explain the effect of orbital altitude on spacecraft design. Derive C/N at spacecraft   8M
        from user transmission.

    b) Explain inter satellite links.   4M

7. a) Explain Big LEO systems.   8M
    b) Compare LEO systems with MEO systems.   4M

8. a) Describe how an MSAT network operates at both L-band and Ku-band.   8M
    b) Consider an un shadowed mobile satellite path operating with a K=5dB. Calculate the   4M
        percent of time the signal amplitude will fade below 6dB.

VARDHAMAN COLLEGE OF ENGINEERING
(AUTONOMOUS)
Two Year M. Tech I Semester Supplementary Examinations April - 2013
(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

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1. a) Prove that for simple binary hypothesis tests the slope of a curve in a ROC at a particular point is equal to the value of threshold n required to achieve the P_D and P_F of the point. 6M
   b) Explain composite hypothesis testing problem? 6M

2. a) Explain the effect of sampling the band limited random signal. 6M
   b) Derive the expression for cumulative mean power and covariance of a process with period approaching infinity. 6M

3. a) Explain the linear estimation in white Gaussian noise. 6M
   b) Derive an expression for the probability of detection and error probability in terms of distance, for the known signal in the additive white Gaussian noise. 6M

4. Explain any one of the multiple channels application with an example? 12M

5. a) Explain to show specifically how the threshold is determined in the Neyman Pearson sense how it depends on false alarm probability p_n, a signal of amplitude A appearing in Gaussian noise background? 6M
   b) Derive the relation between the thresholds to the false alarm probability p_n. 6M

6. Derive MAP estimate of the waveform for modulation system with memory. 12M

7. Write briefly on Kalman filter modeling for recursive estimation of signals in additive noise. Assume one-step prediction and Vector Signal form. 12M

8. a) Explain briefly about fundamental role of optimum role of linear filter? 6M
   b) Let impulse response w(τ), frequency response W(jw), then prove the following 6M
   $$F\left[w^{-1}(\tau)\right] = 1/W(jw) = W^{-1}(jw) = \sqrt{2}k/jw+k.$$

VARDHAMAN COLLEGE OF ENGINEERING
(AUTONOMOUS)
Two Year M. Tech I Semester Regular Examinations April - 2013
(Regulations: VCE-R11)
EMBEDDED LINUX
(Embedded 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

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1.	a)	With the help of diagram explain the architecture of a generic Linux system.	6M
	b)	Write short notes on Host/target linked setup.	6M
2.	a)	Illustrate the steps in *buildrootfilesyste*m.	6M
	b)	Enumerate different steps in booting the brightstar engineering mediaengine.	6M
3.	a)	List and briefly explain different *gdb* commands.	6M
	b)	Describe the steps involved in remote debugging computer configuration.	6M
4.		Write the racer controller state map and explain different states in operational race scenario.	12M
5.	a)	Discuss the features of device drivers.	6M
	b)	Write the program for Snow-Making Control Using Port I/O.	6M
6.		Write short notes on developing Lift Monitoring and Snow-Making Control for the Media Engine.	12M
7.		Illustrate the steps in providing serial communication for bash Scripts, Using query Serial.	12M
8.		With the help of software block diagram explain the Project Trailblazer system integration.	12M

VARDHAMAN COLLEGE OF ENGINEERING
(AUTONOMOUS)
Two Year M. Tech I Semester Regular Examinations April - 2013
(Regulations: VCE-R11)
ADVANCED MICRO PROCESSOR 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

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1. a) What is the function of pointer and index registers present in 8086 microprocessor?   4M
   b) With suitable example explain the following instructions   4M
      i. XLAT
      ii. LOOP
   c) Explain the function of the following flag bits of 8086   4M
      i. The auxiliary carry flag (AF)
      ii. Interrupt flag (IF)

2. a) Explain minimum mode operation of 8086.   6M
   b) Explain the need for wait state and explain how is it introduced in 8086 microprocessor system.   6M

3. a) Explain interrupt types in 8086 with priority levels and specify the actions when an interrupt instruction is executed.   8M
   b) Differentiate between procedures and macro's in 8086.   4M

4. a) Differentiate between RISC and CISC processors.   4M
   b) Explain the salient features of Pentium processors.   8M

5. a) Sketch schematic block diagram of 8255 PPI.   4M
   b) Explain the control word format of 8255.   4M
   c) Write a program to generate a periodic saw tooth wave having 4 volts amplitude using 8255 and DAC interface.   4M

6. a) Discuss the salient features available in 8251 USART and explain how a data can be transmitted at different baud rate.   8M
   b) Explain the function of SCAN lines of 8279.   4M

7. a) Briefly discuss the processor status word register (PSW) of 8051.   4M
   b) Why is 8051 called Boolean processor? Justify with suitable example.   4M
   c) Explain the function of the following pins of 8051   4M
      i. ALE
      ii. RST

8. a) Explain with example the different addressing modes used in 8051.   6M
   b) With diagram explain the operation of port 1 of 8051.   6M

VARDHAMAN COLLEGE OF ENGINEERING

(AUTONOMOUS)

Two Year M. Tech I Semester Regular Examinations April - 2013

(Regulations: VCE-R11)

TRIBOLOGY AND BEARING DESIGN

(Engineering Design)

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

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1.	a)	Write short notes on friction, wear are wear characterization.	6M
	b)	Explain lubrication theories used in bearings.	6M

2.	a)	Derive an expression for flow between parallel stationary plates.	6M
	b)	A full journal bearing has the following specification, shaft diameter 4.5 cm, bearing length 6.5 cm, radial clearance ratio is 0.0015, speed 2800 rpm, radial load 800N, viscosity of lubricant at effective temperature of oil 1.2×10^{-6} Reynold. Considering the bearing as lightly loaded, determine	6M

      i.   Friction torque at the shaft
      ii.   Coefficient of friction
      iii. Power loss

3.	a)	Derive the 2D Reynold's equation with assumptions.	6M
	b)	A rectangular slider bearing with fixed shoe has the following specification, bearing length – 0.0762m, shoe width – 0.065m, slider velocity – 2.54m/sec, load on bearing – 5383.9 N, minimum oil thickness – 1.27×10^{-5} m, mean viscosity of oil – $0.06805 Ns/m^2$. Find the inclination of the surface in radians and degree, coefficient of friction.	6M

4.	a)	Differentiate between lightly loaded and heavily loaded bearings.	6M
	b)	Derive an equation for the load carrying capacity of a journal bearing.	6M

5.	a)	Write short notes on Elasto- hydrodynamic lubricated bearings.	6M
	b)	Derive an equation for gas lubricated bearings.	6M

6.	a)	Derive an equation for load carrying capacity for a hydrostatic bearing.	6M
	b)	A hydrostatic step bearing has the following data:, diameter of the shaft = 150mm, diameter of the pocket = 100mm, vertical thrust on bearing = 60×10^{-3}N, external pressure = atm pressure, shaft speed = 1500 rpm, viscosity of lubricant = 30cP, desirable oil film thickness = 0.0125cm, determine	6M

      i.   Rise of flow of oil,
      ii.   Power loss due to friction
      iii.   Co-efficient of friction

7.	a)	Write short notes on porous bearings.	6M
	b)	Derive an equation for porous bearings with the working principle.	6M

8.	a)	Explain Magneto- hydrodynamic bearings.	6M
	b)	Explain the working principle of magnetic bearings.	6M

VARDHAMAN COLLEGE OF ENGINEERING
(AUTONOMOUS)
Two Year M. Tech I Semester Regular Examinations April - 2013
(Regulations: VCE-R11)
C# AND .NET FRAMEWORK
(Common to Computer Science and Engineering, 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)	State with an example conversion of value type to a reference type.	6M
	b)	Describe C#'s method access modifiers.	3M
	c)	Write a C# program to understand static methods.	3M
2.	a)	Explain the laws of C# casting operations and partial types.	8M
	b)	Illustrate with example how to understand the role of abstract methods in C#.Net.	4M
3.	a)	Write a C# program to implement the core members of the system. Exception type.	6M
	b)	How to build custom exceptions? Explain.	6M
4.		Implement an interface that specifies a behavior to allow an object to be sorted based On some specified key and based on multiple sort orders with example.	12M
5.	a)	List out differences between Private Assembly and Shared Assembly and explain how to implement them.	6M
	b)	Explain the role of Asynccallback delegate in multithreaded applications.	6M
6.	a)	How to serialize objects using Soap formatter?	6M
	b)	Illustrate with example Client Activated Objects.	6M
7.	a)	Describe the functionalities of the form class and the life cycle of a form type.	6M
	b)	Illustrate with an example how to work with some basic controls on the forms.	6M
8.	a)	Explain the role of IDb Connection Interface, IDb Transaction Interface and IDb Command Interface.	6M
	b)	How to insert, update and delete records using command objects? Explain.	6M

VARDHAMAN COLLEGE OF ENGINEERING
(AUTONOMOUS)
Two Year M. Tech I Semester Supplementary Examinations April - 2013
(Regulations: VCE-R11)
EMBEDDED SYSTEMS
(Common to Computer Science and Engineering & 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

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1. An automatic coin operated weighing machine starts the measurement sequence on dropping a coin. It measures the displacement of the plat form to estimate the load. Using the peripherals in any embedded processor such as Timers, Counters, ADC, design a block diagram to perform the weighing and output a printed card.   12M

2. a) Explain all the addressing modes used in 8051 processor.   6M
   b) Explain with examples the following instructions   6M
      i. Move A, @A+DPTR
      ii. Move A, @A+PC

3. a) What is a Debugger? How do you debug an assembly code to check its operation? Give an example.   6M
   b) Write a Timer program to test its operation of overflow flag, interrupt flag and switching to interrupt service.   6M

4. a) Explain the use of I/O ports in 8051, for outputting a data or reading a data.   6M
   b) Using a PORT, implement a 4 X 4 key matrix key board with key encoding and decoding.   6M

5. a) Explain shared data problems and role of semaphores in resolving problems.   6M
   b) Compare and contrast various methods in inter task communication with relevant examples.   6M

6. a) Explain the design considerations that have application to a broad range of embedded systems.   6M
   b) Explain power saving methods.   6M

7. a) Discuss various methods of loading embedded software to target system.   6M
   b) List and explain various laboratory tools.   6M

8. a) Briefly explain SHARC processor programming model w.r.t registers, instruction of groups, addressing modes.   6M
   b) Explain I^{2}C bus.   6M

VARDHAMAN COLLEGE OF ENGINEERING
(AUTONOMOUS)
Two Year M. Tech I Semester Regular Examinations April - 2013
(Regulations: VCE-R11)
OPTICAL COMMUNICATION TECHNOLOGY
(Common to Digital Electronics and Communication Systems & 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

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1. a) Why do modes and not a continuous EM field exist within an optical fiber?   6M
    b) Waveguide dispersion in a single mode fiber is relatively small compared with material dispersion. Explain   6M

2. a) Explain Self Phase modulation and Cross Phase Modulation in Optical fibers   6M
    b) An Engineer needs to design a four wave length WDM system using a dispersion shifted fiber that has a zero dispersion point at 1550 nm. the four wavelengths need to be in the 193.1 and 194.1 THz band on a 100 GHz grid. Where these wavelengths should be placed so that none of the four- wave mixing components interfere with any transmission wavelength?   6M

3. a) Consider a tunable MZI that is constructed on an electro optical crystal having an effective index of 1.5 (n_{eff})   5M
        i.   If the MZI is used to combine two wavelength channels separated by 0.2 nm find the required ΔL if the wavelength is centered at 1550nm.
        ii. Assume the parameter ΔL is varied by electrically modulating the refractive index of the electro optical crystal. What is the index change ΔL needed if the waveguide length (L) is 100mm? Note that the effective optical path length L_{eff} in a waveguide is given by $L_{eff} = n_{eff}L$
    b) Explain the operation of both optical isolators and optical circulators. Discuss the use of these devices in wavelength division multiplexing systems as three and four port devices.   7M

4. a) A 2x2 directional coupler has an input power level of P_o = 200 µW. The output powers at the three ports are P_1 = 90 µW, P_1 = 80 µW and P_1 = 5nW. Define and determine coupling ratio, excess loss, insertion losses at port 0 and 1 and cross talk.   4M
    b) Draw the block diagram of typical Raman amplification system. Explain the terms – stokes shift, Raman gain spectrum and Raman gain length for a Raman Amplifier.   8M

5. a) Develop a relationship between error probability and the received SNR (peak signal power to rms noise power ratio) for a base band optical fiber system. It may be assumed that the number of ones and zeros are equiprobable and that the decision threshold is set midway between the one and zero level.   5M
    b) Discuss, with the aid of a block diagram, the function of major elements of an optical fiber receiver. In addition describe possible techniques for automatic gain control in APD receivers   7M

6. a) Explain largest distance Power Budget for N stations. Obtain power budget for 25 stations in a tabular form if stations are 100m apart, attenuation of fiber is 0.22dB/km at 1550 nm, connector loss is 1dB, Tap loss is 10dB, Coupler throughput loss is 0.9 dB, coupler intrinsic loss =0.5dB   7M

   b) Explain operating principles of WDM and WDM standards   5M

7. a) Explain the effect of Simulated Brillouin Scattering on signal power in an optical fiber   8M

   b) A single mode fiber has an attenuation of 0.55dB/km at 1310 nm and 0.28 dB/km at 1550 nm. Compare the effective lengths of this fiber at 1310 nm and 1550 nm.   4M

8. a) Explain the network terms (i)virtual circuit, (ii) virtual topology and (iii) broadcast and select.
   Indicate their application and role in optical networks   6M

   b) Explain the test set up and display output for measuring chromatic dispersion by the phase shift method   6M

VARDHAMAN COLLEGE OF ENGINEERING

(AUTONOMOUS)

Two Year M. Tech I Semester Regular Examinations April - 2013

(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

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1.	a)	Explain advantages and history of FPGA.	6M
	b)	With neat flowchart, explain design abstraction ladder for FPGAs.	6M
2.	a)	Describe Xilinx Spartan-II combinational logic block with neat logic diagram.	6M
	b)	Explain one time programmable based FPGA. Write its basic programming elements.	6M
3.	a)	Discuss the different logic elements to design FPGAs fabrics.	6M
	b)	How will you connect two logic elements in FPGA? Illustrate Rents rule.	6M
4.	a)	Why power and energy optimization is required for logic circuit? Explain.	6M
	b)	What is barrel shifter & serial adder? Write their importance with block view.	6M
5.	a)	Explain syntax directed translation with example. How you will implement the logic by macro.	6M
	b)	Describe the importance of placement in FPGA. Differentiate Clustering V_s Partitioning.	6M
6.	a)	Explain the sequential machine design process by taking suitable example.	6M
	b)	Discuss the clocking disciplines.	6M
7.	a)	Describe PAL outputs with programmable polarity.	6M
	b)	Design BCD counter using appropriate programmable logic elements or devices.	6M
8.	a)	Draw the simplified block diagram for Xilinx XC4000 series CLB and explain the function briefly.	6M
	b)	Compare & list out the advantages of ALTERAs logic8000 with Xilinx XC4000.	6M

VARDHAMAN COLLEGE OF ENGINEERING
(AUTONOMOUS)
Two Year M. Tech I Semester Regular Examinations April - 2013
(Regulations: VCE-R11)
SYSTEM MODELING AND SIMULATION
(Embedded 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

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1.	a)	How the simulation models are classified and explain any one?	6M
	b)	Consider a single server system for which the inter arrival times are independent and identically distributed random variables. Describe how the simulation is done for the given system.	6M
2.		What is GPSS? Explain in detail how they are used to build a model of a small factory with appropriate diagram.	12M
3.	a)	Discuss six classes of techniques for increasing the validity and credibility of a Simulation module	6M
	b)	Explain timing & relationship of validation, verification and establishing credibility.	6M
4.	a)	Describe the unit – step response to the distributed delay shown in figure. Assume zero initial loading at time t=0.	6M
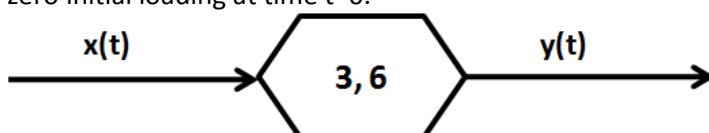
	b)	Consider a single stage distributed delay with constant delay Δ. Assuming a zero initial state at t=0 and a unit – step input, derive an explicit solution for the output y(t).	6M
5.	a)	Consider the open – loop system shown in figure with set – point x(k)=12, transfer function ½ , and a deterministic disturbance $d(k)=2 \sin \frac{1}{10} \pi k$. Analyze the system and intimate the feedback control so as to reduce the disturbance effects.	6M
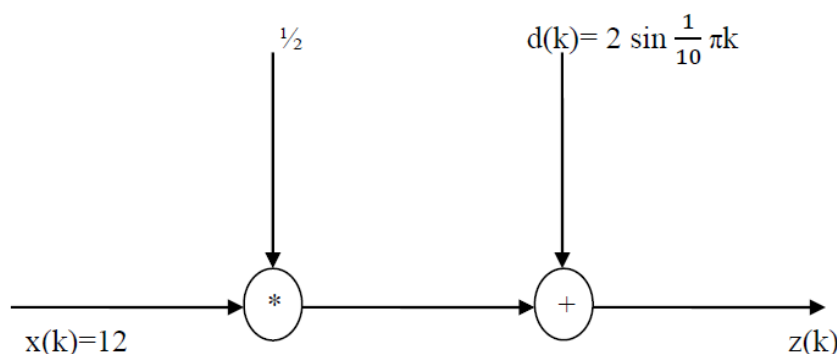
	b)	Implement a simulation of the dining philosophers' problem. Verify it's proper Working and test for deadlock.	6M
6.	a)	A game of chance has probability p of winning and probability q=1-p of losing. If a gambler wins, the house pays him a dollar. If he loses he pays the house the same amount. Suppose the gambler, who initially has 2 dollars, decides to play until he is either broke or doubles his money. Represent the night's activity as a Markov Chain.	6M
	b)	Suppose that telephone calls arrive randomly throughout the day at an office, at an average rate of two calls per minute. Assuming this to be a Poisson process. i) How many calls can be expected between 2:00 and 2:05? ii)What is the probability that no calls will be received between 2:00 and 2:01? iii)What is the probability that more than one call will be received between 2:03 to 2:04?	6M

7. a) Suppose a small office has a traditional telephone system with two lines. If one line is busy, the next incoming call "bounces" to the second line. If both lines are busy, any additional calls ring busy and are lost. Calls arrive at mean rate of 10 calls per hour and the average length of a phone call is 4 minutes. Assuming Markovian arrivals and call duration, describe the system behavior. In particular, estimate the number of lost calls over a 9 hour business days' time. 6M

    b) A mail order company's phone system is equipped with an automatic answering module. Customer's calls arrive as a Poisson process at the rate of 20 calls per hour, whereas the service time is exponentially distributed with a mean of 2.5 minutes. Determine the probability of a customer taking more than 4 minutes of service time 6M

8. a) Consider the objective function $f(C_1,C_2)=e^{-(C_1^2+c_2^2)}\sin (C_1^2+C_2^2)$ 6M
       i) Using calculus methods, find the families of local minima
       ii) Apply the cyclic coordinate's algorithm to find a local minimum point. Explain your results

    b) Suppose an ideal signal $x_1(t)=\sin t+\sin 2t$ is combined with uniformly distributed white noise with unit variance to form an observed signal. This observed signal is sampled at a sampling frequency $f=1/\delta =10$ samples per unit time. Compute and compare the estimates $u(k)$ and $v(k)$ against the ideal functional value and the derivative of the signal. 6M

VARDHAMAN COLLEGE OF ENGINEERING

(AUTONOMOUS)

Two Year M. Tech I Semester Regular Examinations April - 2013

(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

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1.	a)	From the basic principles, Derive the expressions for photo current and load current.	6M
	b)	Explain in brief various applications of super conducting materials in electrical equipments and systems.	6M
2.	a)	What is an Ideal MHD, and with relevant expressions validate the performance of Generator?	7M
	b)	Compare & contrast Faraday & Hall configuration in MHD generation.	5M
3.	a)	Explain various properties of Air and Wind.	5M
	b)	State the various operating characteristics of wind turbine	7M
4.	a)	Explain the various modes of operation in a Tidal power plant.	6M
	b)	Explain various types of Generators along with applications used for Tidal power Generation.	6M
5.	a)	Compare and contrast with open & closed cycle OTEC scheme.	6M
	b)	Explain various applications of OTEC systems.	6M
6.	a)	Explain the conversion methods of biomass in to usable fuels.	6M
	b)	Explain the basic principle involved in Generation of power from Geo Thermal means.	6M
7.	a)	Explain various methods of energy storage in different energy conversion systems and compare them.	6M
	b)	With neat block Diagram, Explain the concept of combined cycle cogeneration.	6M
8.	a)	What is fuel cell and describe the principle of working of fuel cell with reference to H_2O_2 cell?	7M
	b)	Explain about eco friendly type Energy Conversion Systems.	5M

VARDHAMAN COLLEGE OF ENGINEERING

(AUTONOMOUS)

Two Year M. Tech I Semester Regular Examinations April - 2013

(Regulations: VCE-R11)

DESIGN FOR MANUFACTURING

(Engineering Design)

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)	With help of a flow chart explain the phases in morphology of design.	6M
	b)	Discuss the effect of manufacturing processes of design?	6M
2.	a)	Explain the aspects considered in manufacturing operations to lower the cost of products.	6M
	b)	List out the review of relationship between attainable tolerance grades on different machining process.	6M
3.	a)	Enumerate the advantages of interchangeable assembly over selective assembly, with suitable examples.	6M
	b)	Write short notes on Geometric dimensioning and tolerancing.	6M
4.	a)	Explain why changing of the datum is required with suitable example.	6M
	b)	Discuss functional datum.	6M
5.	a)	Describe the design consideration in casting of metals.	6M
	b)	Emphasize the importance of identifying the possible parting line in casting with suitable sketches.	6M
6.	a)	How are the forces in turning, drilling and milling estimated?	6M
	b)	List and explain the aspects considered in the design of machine components that comply with production technique requirements.	6M
7.	a)	What are dimensional tolerances? Why is their control important?	6M
	b)	Explain functional gauging.	6M
8.	a)	What is a limit gauge? What are advantages and limitations in inspection process?	6M
	b)	With neat sketches, explain the principle of operating the limit gauges to check shafts.	6M