

**Code No: 13MTE1001****ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI  
(AUTONOMOUS)****I M.Tech. I Semester Regular/Supplementary Examinations, February-2016****OPTIMIZATION TECHNIQUES AND APPLICATIONS****(THERMAL ENGINEERING)****Time: 3 hours****Max. Marks: 60****Answer any FIVE questions  
All questions carry equal marks**

1.
  - a) List out the applications of optimization in engineering.
  - b) Discuss about Uni-modal function
2. Using geometric programming solve the following problem  $\text{Max } f(x) = 80x_1x_2 + 40x_2x_3 + 20x_1x_3 + 80/x_1x_2x_3$
3. Solve the following by using dynamic programming technique
$$\begin{aligned}\text{Max } Z &= 2x_1 + 5x_2 \\ 2x_1 + x_2 &\leq 430 \\ 2x_2 &\leq 460 \\ x_1, x_2 &\geq 0\end{aligned}$$
4.
  - a) What are the operating characteristics of a queuing system.
  - b) What are the advantages of simulation.
5. Solve the following Integer programming problem
$$\begin{aligned}\text{Max } Z &= 5x_1 + 7x_2 \\ -2x_1 + 3x_2 &\leq 6 \\ 6x_1 + x_2 &\leq 30 \\ x_1, x_2 &\geq 0 \text{ \& Integers}\end{aligned}$$
6.
  - a) Minimize the function  $f(x) = x(x-1.5)$  in interval (0,1) to within  $\pm 10\%$  of initial interval using fibonacci method
  - b) Discuss about Integer programming problem, its classification and its applications.
7.
  - a) Discuss about the random variables and their types.
  - b) Minimize  $Z = -45x_1 - 100x_2 - 30x_3 - 50x_4$  subjected to
$$\begin{aligned}7x_1 + 10x_2 + 4x_3 + 9x_4 &\leq 1200 \\ 3x_1 + 40x_2 + x_3 + x_4 &\leq 800 \\ x_1, x_2, x_3, x_4 &\geq 0\end{aligned}$$

(a) Discuss the effect of changing the requirement vector from R.H.S values [1200 800] to [1500 1000]
8. Solve the following linear programming problem by simplex method
$$\begin{aligned}\text{Max } Z &= 5x_1 + 3x_2 \\ 2x_1 + 4x_2 &\leq 12 \\ 2x_1 + 2x_2 &= 10 \\ 5x_1 + 2x_2 &\geq 10 \\ x_1, x_2 &\geq 0\end{aligned}$$

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**Code No: 13MPE1001**

**SET-1**

**ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI  
(AUTONOMOUS)**

**I M.Tech. I Semester Regular/Supplementary Examinations, February-2016**

**ELECTRICAL MACHINE MODELING AND ANALYSIS**

**(Power Electronics and Electric Drives)**

**Time: 3 Hours**

**Max Marks: 60**

**Answer any FIVE questions  
All questions carry EQUAL marks**

1. Obtain the mathematical model of D.C series Motor. [12M]
2. Obtain the real time model of a two phase induction motor. [12M]
3. Derive the equations of three phase induction motor with [12M]
  - a) Synchronously rotating reference frame.
  - b) Rotor reference frame.
4. Derive the voltage and torque equations in stationary reference frame for unsymmetrical induction motor. [12M]
5. Express the electromagnetic torque-current of a synchronous motor in terms of flux linkages. [12M]
6.
  - a) Explain the concept of Equal Area Criteria [6M]
  - b) Compare actual and approximate transient torque characteristics of a synchronous machine [6M]
7. Explain the procedure of using transformation to obtain constant matrices of three phase induction motor. [12M]
8. Derive the Small signal equations of three phase Induction machine. [12M]

## DIGITAL SYSTEM DESIGN

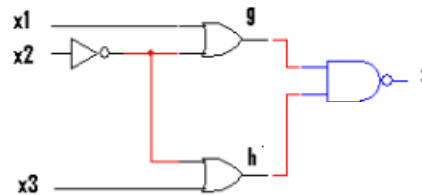
(Common to VLSI System Design and Digital Electronics & Communication Systems)

Time: 3 hours

Max. Marks: 60

Answer any FIVE questions  
All questions carry equal marks

1. (a) Explain With an example, the use of ASM charts in the design of digital circuits. [6M]  
(b) Differentiate VHDL with Verilog HDL with respect to various constructs Operators and keywords. [6M]
2. (a) Implement the following Boolean function by Hazard free OR-AND network [4M]  
 $F = \Sigma(0, 2, 6, 7)$ .  
(b) Explain the differences between CPLD AND FPGA Architectures. [8M]
3. (a) Derive by the path sensitization method the test vectors for SA-0 and SA-1 faults at g and h in the network. [6M]



- (b) Find the test vectors of all SA0 and SA1 faults of the circuit function. [6M]  
 $F = x_1x_2 + x_1x_3'x_4' + x_2x_4$  using Kohavi algorithm
4. (a) Explain the signature analysis and testing for bridging faults with suitable example. [6M]  
(b) Perform the analysis and explain the test pattern generation using PODEM algorithm. [6M]
5. Minimize the following function implemented on PLA using IISC algorithm. [12M]  
 $f = 2120 + 0102 + 1121 + 0002$
6. (a) Distinguish between maximum folding and optimum folding. [6M]  
(b) With an example explain about minimization and folding of a PLA using SCF method. [6M]
7. (a) Discuss briefly about testable PLA design. [6M]  
(b) Explain about state identification experiments [6M]
8. (a) Explain briefly about the following terms: [6M]  
(i) Flow table (ii) Minimum closed covers  
(b) Discuss about races, and hazards in connection with Asynchronous sequential machine design. [6M]

**DATA STRUCTURES AND ALGORITHMS  
(COMPUTER SCIENCE AND ENGINEERING)**

**Time: 3 hours**

**Max. Marks: 60**

**Answer any FIVE questions  
All questions carry equal marks**

1. Define queue. Describe the Queue ADT. [12M]
2. (a) Derive the time complexity of quick sort. [6M]  
(b) Explain Multi-way Merge Technique [6M]
3. Define Hash Function. Discuss about various collision resolution techniques in detail [12M]
4. (a) Explain insertion and deletion of an element in Binary search tree with the help of an algorithm. [12M]
5. Explain various rotations used in AVL trees to balance the height of a binary tree. [12M]
6. (a) Explain the procedure for all pairs shortest paths problem [6M]  
(b) Write an algorithm for finding minimum cost of the graph using Kruskal's algorithm. [6M]
7. (a) Give the control abstraction for Greedy Method. [6M]  
(b) Explain Strassen's matrix multiplication algorithm with an example [6M]
8. (a) Define the Graph Coloring Problem. [6M]  
(b) Write the algorithm for Sum of subsets problem. [6M]

Answer any FIVE questions  
All questions carry equal marks

1. Use the method of separation of variables to find the solution to [12M]  
 $u_{tt} + 3u_t + u = u_{xx}$  ,  $0 < x < 1$   
 $u(0,t) = 0$ ,  $u(1,t) = 0$   
 $u(x,0) = 0$ ,  $u_t(x,0) = x \sin(2\pi x)$

2. Solve the Laplace equation on semi-annulus [12M]  
 $\Delta u = 0$  ,  $1 < r < 2$  ,  $0 < \theta < \pi$   
 $u(r,0) = u(r,\pi) = 0$  ,  $1 < r < 2$   
 $u(1,\theta) = \sin \theta$  ,  $0 < \theta < \pi$   
 $u(2,\theta) = 0$  ,  $0 < \theta < \pi$

3. Solve the problem  $\Delta v = 0$  in the rectangle  $0 < x < a$ ,  $0 < y < b$  with boundary conditions [12M]  
 $v(0,y) = v(a,y) = v(x,b) = 0$  ;  $v(x,0) = g(x)$ .

4. For the variable  $X_1$ ,  $X_2$  and  $X_3$  it is given that  $\sigma_1^2 = 2$ ,  $\sigma_2^2 = \sigma_3^2 = 3$  ,  $r_{12} = 0.7$ , [12M]  
 $r_{23} = r_{31} = 0.5$  Find  $r_{23,1}$ ,  $R_{1,23}$  and  $b_{13,2}$ .

5. a. For the data given below fit a parabola of the form  $y = ax^2 + bx + c$  for the [6M]  
 following data

X	1960	1962	1964	1964	1968
Y	125	140	165	195	230

[6M]

- b. For the 10 observations on X and Y the following data were observed.  
 $\Sigma x = 130$  ,  $\Sigma y = 200$  ,  $\Sigma x^2 = 2288$  ,  $\Sigma y^2 = 5506$  ,  $\Sigma xy = 3467$  obtain regression  
 line of Y on X. Find Y when X = 16.

6. Find correlation coefficient for the following data [12M]

X	65	66	67	67	68	69	70	72
Y	67	68	65	68	72	72	69	71

7. Solve the following system of equation by LU-decomposition [12M]

$$2x - 2y - 2z = -4, \quad -2y + 2z = -2, \quad -x + 5y + 2z = 6$$

8. Use Gaussian Elimination method to solve the following system of linear equations [12M]  
 $2x_2 + x_3 = 8$  ,  $X_1 - 2x_2 - 3x_3 = 0$  ,  $-x_1 + x_2 + 2x_3 = 3$ .