

Answer any FIVE questions  
All questions carry EQUAL marks

1. (a) Define the gradient of the function. Explain its importance in the multi variable optimization. 5M  
(b) Minimize  $f(x) = x_1^2 + x_2^2 + 2x_1 + 4x_2 + 5$ , using the steepest descent method starting at the point  $x_1 = 0$  and  $x_2 = 0$ . 7M
2. (a) Find the minimum of  $f(x) = (x^3 + 54)/x$  by the cubic interpolation method with an accuracy of  $10^{-3}$ . 9M  
(b) What is the difference between Fibonacci and golden section methods? 3M
3. (a) What is meant by normality condition in a Geometric programming problem? 6M  
(b) Using Geometric programming find the dimensions of the rectangle of maximum area which can be inscribed in a circle of radius  $r$ ? 6M
4. Solve the following problem using dynamic programming  
Minimize  $Z = y_1^2 + y_2^2 + y_3^2$  12M  
Subject to  $y_1 + y_2 + y_3 \geq 30$ ;  $y_1, y_2, y_3 \geq 0$
5. Given the linear programming problem  
Minimize  $Z = 3x_1 + 5x_2$  subject to the constraints  
 $x_1 + x_2 \leq 1$ ;  $2x_1 + 3x_2 \leq 1$ ;  $x_1, x_2 \geq 0$  12M  
Obtain the variations in  $C_j$  ( $j = 1, 2$ ) which are permitted without changing the optimal solutions.
6. (a) A tourist car owner has 25 taxis in operation. He keeps three drivers as reserve to attend the calls, in case the scheduled driver reports sick. The probability distribution of sick drivers is as follows:  

No.of sick	0	1	2	3	4	5
Probability	0.20	0.25	0.20	0.15	0.12	0.08

8M  
 Use Monte Carlo Method to estimate the utilization of reserve drivers and the probability that at least one taxi will be off the road due to non-availability of a driver.
- (b) What is simulation? Explain why is it used? 4M
7. Find the optimal solution to the following all I.P.P.  
Maximize  $Z = x_1 + 2x_2$  subject to the constraints 12M  
 $x_1 + x_2 \leq 7$ ;  $2x_1 \leq 11$ ;  $2x_2 \leq 7$ ;  $x_1, x_2 \geq 0$  and are integers
8. (a) A doctor recommends a patient to go on a particular diet for two weeks and there is equal likely hood for the patient to lose his weight between 2kg and 4kg. What is the average amount the patient is expected to lose on this diet? Calculate also the variance and standard deviation of the random variable. 6M  
(b) What is the difference between probability density and probability distribution functions? 6M

# AR16

# SET 1

**Code No: 16MPE1001**

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

**I M.Tech I Semester Regular & Supplementary Examinations, February-2018**

**ELECTRICAL MACHINE MODELING AND ANALYSIS  
(Power Electronics and Drives)**

**Time: 3 hours**

**Max. Marks: 60**

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

1. What are the conventions adopted in the generalized machine theory, and explain the commutated machine with neat sketch? [12M]
2. Draw the equivalent circuits of three phase synchronous machine with the reference frame fixed in rotor and write the current and voltage equations? [12M]
3. Derive an expression for electromagnetic torque in arbitrary reference frame variables for a two phase machine in terms of currents and flux linkages, and also develop the equivalent circuits for this machine? [12M]
4. Derive the small signal equations of three phase induction machine [12M]
5. Determine the critical clearing time and critical clearing angle for the hydro and steam units using only the  $\sin \delta$  terms of the approximate transient torque – angle curves? [12M]
6. Discuss the dynamic performance of synchronous machine when the three phase short circuit fault occurs? [12M]
- 7
  - a) Discuss the cross field theory of single phase induction machine? [4M]
  - b) Derive the voltage and torque equations in stationary reference frame variables for unsymmetrical two phase induction machine [8M]
8. Derive the transformation for currents between rotating balance 2-phase( $\alpha, \beta, 0$ ) winding and pseudo – stationary 2-phase (d,q,0) winding. [12M]

\*\*\*

**AR16**

**Set-01**

**Code No: 16MVL1001**

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

**I M.Tech I Semester Regular & Supplementary Examinations, February-2018  
Digital System Design & Testing  
(VLSI System Design)**

**Time: 3 hours**

**Max. Marks: 60**

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

---

1. (a) Explain the basic building blocks of an ASM chart.  
(b) Describe the rules for state assignment with an example.
2. (a) Describe the important features of an FPGA.  
(b) Give the procedural steps involved in the design of an iterative circuit.
3. (a) Explain the path sensitization technique with an example.  
(b) Give the classification of faults that may occur in digital circuits.
4. (a) What is random testing? Explain.  
(b) Explain the procedure involved in D algorithm with an example.
5. Explain the design procedure of Fault detection experiment with an example.
6. Explain about PLA minimization and PLA folding by taking examples.
7. (a) Describe various faults that may occur in the PLAs.  
(b) Implement the following functions using PLA.  
 $F_1(A,B,C) = \sum(0,2,5,7)$  and  $F_2(A,B,C) = \sum(2,3,5,6,7)$
8. Write short notes on  
(a) Minimal Closed covers.  
(b) Races and hazards.

# AR16

**CODE: 16MCS1001**

**SET-2**

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

**I M.Tech I Semester Regular & Supplementary Examinations, February-2018**

**DATA STRUCTURES AND ALGORITHMS**

**Computer Science and Engineering**

Time: 3 Hours

Max Marks:60

Answer any FIVE questions  
All questions carry EQUAL marks

- |        |   |       |
|--------|---|-------|
| 1. (a) | What is the importance of space and time complexities in the performance analysis of data structures?       | 6M    |
| (b)    | Explain about various types of linked list by using suitable examples.                                      | 6M    |
| 2. (a) | Compare Linear search and Binary search with example. What are the advantages of Binary search?             | 6M    |
| (b)    | Write an algorithm for quick sort.  | 6M    |
| 3. (a) | Explain Open Hashing and Closed Hashing methods with the help of examples.                                  | 8M    |
| (b)    | What is Skip Lists? Discuss.  | 4M    |
| 4.     | Discuss about different Graph representation techniques .Also write all operations of Graphs.               | 12M   |
| 5. (a) | Explain about Floyd's algorithm with an example.  | 7M    |
| (b)    | Write Warshall's algorithm.   | 5M    |
| 6.     | What is Spanning Tree? Explain the procedure for obtaining Minimum Spanning Tree using Kruskal's algorithm. | 12M   |
| 7.     | Explain in detail about travelling Salesman problem with example.   | 12M   |
| 8.     | Write short notes for the following    a) Shortest path problem   | 4M    |
|        | (b)Knapsack problem        c) Binary Search Tree  | 4M+4M |

ADVANCED MATHEMATICS  
(Structural Engineering)

Time: 3 Hours

Max Marks:60

Answer any FIVE questions

All questions carry EQUAL marks

1. Solve  $y \frac{\partial u}{\partial x} + x \frac{\partial u}{\partial y} = 3u$  and  $u(x, 0) = e^{-x^2}$  by the method of separation of variables 12M
2. Rectangular plate is bounded by the lines  $x = 0, y = 0, x = a$  and  $y = b$ . The edge temperatures are given by  $u(0, y) = 0, u(x, b) = 0, u(a, y) = 0$  and  $u(x, 0) = 5 \sin\left(\frac{5\pi x}{a}\right) + 3 \sin\left(\frac{3\pi x}{a}\right)$ . Find  $u(x, y)$  the steady state temperature 12M
3. Solve  $\frac{\partial u}{\partial t} = \frac{\partial^2 u}{\partial x^2}$  in  $0 \leq x \leq 1, t \geq 0$ , given that  $u(x, 0) = \sin \pi x, u(0, t) = u(1, t) = 0$  12M  
Compute  $u$  for two levels with  $h = \frac{1}{3}, k = \frac{1}{36}$  by Schmidt's method
4. (a) If a sample is taken from an infinite population, what is the effect on standard error of the mean when sample size is increased from 400 to 900? 6M  
(b) Ten bearings made by a certain process have mean diameter of 0.5060 cm with a standard deviation of 0.0040 cm. Assuming that the data may be taken as a random sample from a normal population, construct 95% confidence interval for the actual average diameter of the bearings. 6M
5. (a) In a random sample of 60 workers, the average time taken by them to get work is 33.8 minutes with a standard deviation 6.1 minutes. Can we reject the null hypothesis  $\mu = 32.6$  minutes in favour of the alternative hypothesis  $\mu > 32.6$  at  $\alpha = 0.025$  level of significance. 6M  
(b) The means of two large samples of sizes 1000 and 2000 are respectively 67.5 and 68.0. Can the samples be regarded as drawn from the same population of standard deviation 2.5 at 5% level of significance? 6M
6. Psychological tests of intelligence and engineering ability were applied to 10 students. Here is a record of ungrouped data showing intelligence ratio (IR) and engineering ratio (ER). Calculate the coefficient of correlation 12M
 

Student	A	B	C	D	E	F	G	H	I	J
IR $x$	105	104	102	101	100	99	98	96	93	92
ER $y$	101	103	100	98	95	96	104	92	97	94
7. (a) Find the linear regression for the following data 6M
 

x	1	2	3	4	5
y	10	20	30	40	50
- (b) Ten participants in a contest are ranked by two judges as follows 6M
 

$x$	1	6	5	10	3	2	4	9	7	8
$y$	6	4	9	8	1	2	3	10	5	7

 Calculate the rank correlation coefficient
8. Using finite difference method, solve  $\frac{d^2 y}{dx^2} = x + y, y(0) = 0, y(1) = 0$  with  $h = \frac{1}{4}$  12M

# AR13

# SET 1

Code No: 13MPE1001

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI  
(AUTONOMOUS)

I M.Tech I Semester Supplementary Examinations, February-2018

**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. What are the conventions adopted in the generalized machine theory, and explain the commutated machine with neat sketch? [12M]
2. Draw the equivalent circuits of three phase synchronous machine with the reference frame fixed in rotor and write the current and voltage equations? [12M]
3. Derive an expression for electromagnetic torque in arbitrary reference frame variables for a two phase machine in terms of currents and flux linkages, and also develop the equivalent circuits for this machine? [12M]
4. Derive the small signal equations of three phase induction machine [12M]
5. Determine the critical clearing time and critical clearing angle for the hydro and steam units using only the  $\sin \delta$  terms of the approximate transient torque – angle curves? [12M]
6. Discuss the dynamic performance of synchronous machine when the three phase short circuit fault occurs? [12M]
- 7
  - a) Discuss the cross field theory of single phase induction machine? [4M]
  - b) Derive the voltage and torque equations in stationary reference frame variables for unsymmetrical two phase induction machine [8M]
8. Derive the transformation for currents between rotating balance 2-phase( $\alpha, \beta, 0$ ) winding and pseudo – stationary 2-phase (d,q,0) winding. [12M]

\*\*\*

**Code No: 13MVL1001**

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

**I M.Tech I Semester Supplementary Examinations, February-2018**

**DEGITAL 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 the basic building blocks of an ASM chart.  
(b) Describe the rules for state assignment with an example.
2. (a) Describe the important features of an FPGA.  
(b) Give the procedural steps involved in the design of an iterative circuit.
3. (a) Explain the path sensitization technique with an example.  
(b) Give the classification of faults that may occur in digital circuits.
4. (a) What is random testing? Explain.  
(b) Explain the procedure involved in D algorithm with an example.
5. Explain the design procedure of Fault detection experiment with an example.
6. Explain about PLA minimization and PLA folding by taking examples.
7. (a) Describe various faults that may occur in the PLAs.  
(b) Implement the following functions using PLA.  
 $F_1(A,B,C) = \sum(0,2,5,7)$  and  $F_2(A,B,C) = \sum(2,3,5,6,7)$
8. Write short notes on
  - (a) Minimal Closed covers.
  - (b) Races and hazards.