Reg. No. | | | | | | | | | | | | |

Question Paper Code : 66193

M.E. DEGREE EXAMINATION, DECEMBER 2015/JANUARY 2016

First Semester

Applied Electronics

MA 7157 : APPLIED MATHEMATICS FOR ELECTRONICS ENGINEERS

(Common to M.E. Biomedical Engineering, M.E. Medical Electronics and M.E. VLSI Design)

(Regulations 2013)

Time : Three Hours **Maximum : 100 Marks**

Answer ALL questions.

PART – A (10 × 2 = 20 Marks)

1. Define tautology and contradiction.
2. Define three valued logic with example.
3. What is single value decomposition in complex matrix ?
4. Obtain the matrix for the quadratic form $Q = 2x_1^2 + 3x_1 x_2 + x_2^2$.
5. Show that the function $f(x) = \begin{cases} \frac{3x^2}{9}, & -1 < x < 2 \\ 0 & \text{otherwise} \end{cases}$ is a probability density function.
6. Find the moment generating function of Binomial distribution.
7. What is principle of optimality ?
8. Define knapsack problem.
9. Define Kendall's notation to represent a queuing model.
10. Give example of self service model.

PART – B (5 × 16 = 80 Marks)

11. (a) (i) Define Lukasiewicz three valued logics $\wedge$, $\vee$, $\Rightarrow$, $\Leftrightarrow$ in the form of table. 8

(ii) Write each of the following in symbolic form :

All men are giants

No men are giants

Some men are giants

Some men are not giants. 8

OR

(b) (i) Explain unconditional and unqualified preposition in fuzzy logic with suitable example. 8

(ii) Define fuzzy quantifier of first kind with example. 8

12. (a) Solve the system of equations

$4x_1 - x_2 - x_3 = 3$

$-x_1 + 4x_2 - 3x_3 = -0.5$

$-x_1 - 3x_2 + 5x_3 = 0$

Using the Choleski method. 16

OR

(b) Find the singular value decomposition of matrix $\begin{bmatrix} 1 & 1 \\ 1 & 1 \\ 1 & 1 \end{bmatrix}$. 16

13. (a) (i) An insurance company found that only .01 of the population is involved in certain type of accident each year. If its 100 policy holders were randomly selected from the population, what is the probability that not more than two of its clients are involved in such accident next year. 8

(ii) Find the mean and variance of uniform distribution. 8

OR

(b) (i) A random variable X has the following probability function :

X:	0	1	2	3	4	5	6	7
$P[X = x]$:	0	k	2k	2k	3k	k^2	$2k^2$	$7k^2+k$

(1) Find k.

(2) Find $P[0 < X < 5]$.

(3) If $P[X \le k] > \frac{1}{2}$ find 'k'. **8**

(ii) The random variable X is normally distributed with mean 9 and S.D. 3 :

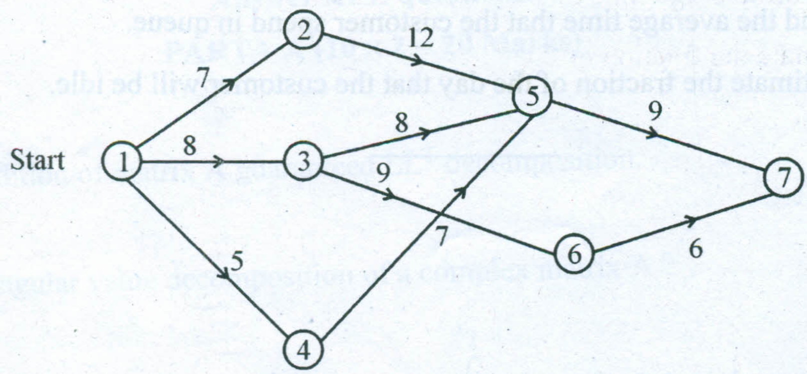
(1) Find $P[X \ge 15]$

(2) $P[X \le 15]$

(3) Find $P[0 \le X \le 9]$

(4) If $P[X > a] = 0.16$ find a. **8**

14. (a) Find the shortest highway route between starting city at node 1 and destination city at node 7 by backward recursion. **16**



OR

(b) Acme manufacturing produces two products the daily capacity of the manufacturing process is 430 minutes. Product 1 requires 2 minutes per unit. There is no limit on the amount produced of product 1, but the maximum daily demand for product 2 is 230 units. The unit profit of product 1 is \$2 and that of product 2 is \$5. Find the optimal solution by DP. **16**

15. (a) (i) A community is served by two cab companies. Each company owns two cabs, and the two companies are known to have equal shares of market. This is evident by the fact that calls arrive at each company's dispatching office at the rate of eight per hour. The average time per ride is 12 minutes. Calls arrive according to Poisson distribution and the ride time is exponential. The two companies recently were bought by an investor who is interested in consolidating them into single dispatching office. Analyse new owner's proposal. **8**

(ii) Describe self service model and find p_n, mean L_s, L_q and W_q. **8**

OR

(b) Customers arrive at one man barber shop according to Poisson process with mean inter arrival time of 20 minutes. Customers spend an average of 15 minutes in the barber chair. If an hour is used as a unit of time, then

(i) What is the probability that a customer need not wait for a haircut ?

(ii) What is the expected number of customers in the barber shop and in the queue ?

(iii) How much time can a customer expect to spend in the barber shop ?

(iv) Find the average time that the customer spend in queue.

(v) Estimate the fraction of the day that the customer will be idle. **16**