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

Question Paper Code: 12071

M.E. DEGREE EXAMINATION, DECEMBER 2013.

First Semester

VLSI Design

01PMA 123 - APPLIED MATHEMATICS FOR ELECTRONICS ENGINEERS

(Regulation 2013)

Duration: Three hours Maximum: 100 Marks

Answer ALL Questions.

PART A - (10 x 2 = 20 Marks)

1. Define logic formulae.
2. What is standard Lukasiewicz logic?
3. Is Cholesky factorization is possible for $\begin{bmatrix} 4 & 8 & 2 \\ 8 & 20 & 20 \\ 2 & 20 & 41 \end{bmatrix}$. Why?
4. What is QR factorization method?
5. Find the mean and variance of the uniform distribution in the (a, b)
6. The time in hours required to repair a machine is exponentially distributed with parameter *w = 1/20*. What is the probability that the required time exceeds 30 hours?
7. What are the three basic elements of Dynamic Programming model?
8. What are the difference between dynamic programming and linear programming?
9. What are the characteristics of Queuing System?
10. What are the different types of Queuing models?

PART -- B (5 x 16 = 80 Marks)

11. (a) Explain fuzzy propositions of various types with suitable examples. (16)

Or

(b) Explain absolute and relative quantifiers with examples. (16)

12. (a) Solve the equations $2x + 3y + z = 9$
$x + 2y + 3z = 6$
$3x + y + 2z = 8$
using LU Factorization method. (16)

Or

(b) Construct a single value decomposition for the matrix A = $\begin{bmatrix} 5 & 6 & 2 \\ 6 & 1 & 4 \\ 2 & 4 & 7 \end{bmatrix}$ (16)

13. (a) (i) The probability distribution function of x is given by
$P(x) = Ae^{-|x|}$, $-\infty < x < \infty$
Find A, mean and variance (8)

(ii) Out of 800 families of 5 children each, how many would you expect to have
a) 3 boys b) 5 girls (8)

Or

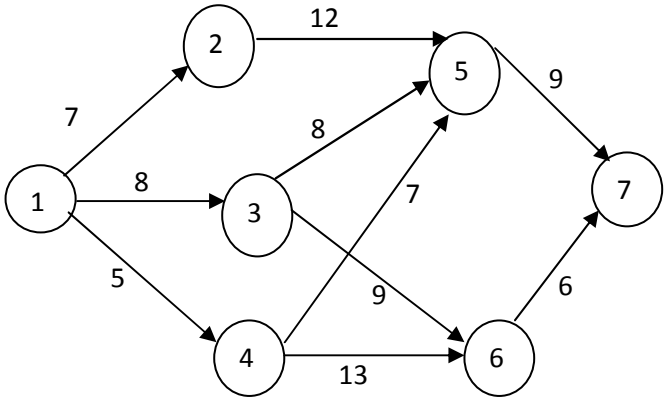
(b) (i) Fit a Poisson distribution to the following data

x	0	1	2	3	4
f	122	60	15	2	1

(8)

(ii) If X is a normal variate with mean 30 and standard deviation 5 find
1. $P(26 \leq x \leq 40)$ 2. $P(x \geq 45)$ (8)

14. (a) (i) The following network provides the possible route between the starting city at node-1 and the destination city at node-7. Find the shortest distance and the shortest path from node-1 to node-7 using Dynamic Programming approach.



(8)

(ii) Maximize $z = 2x + 5y$,

subject to

$$2x + y \leq 430$$

$$y \leq 230$$

$$x, y \geq 0$$

using dynamic programming. (8)

Or

(b) (i) An investor wants to invest Rs.4000 now and Rs.2000 at the start of the years 2 to 4. The interest rate offered by first bank is 8% compounded annually and the bonuses over the next 4 years are 1.8%, 1.7%, 2.1% and 2.5% respectively. The annual interest rate offered by second bank is 0.2% lower than that of fist bank, but its bonus is 0.5% higher. Maximize the accumulated capital at the end of 4 years. (8)

(ii) A 4 ton vessel can be loaded with one or more of three items. The following table gives the unit weight w_i in tons and the unit revenue in thousands of dollars r_i for item i. How should the vessel be loaded to maximize the total return? (8)

Item (i)	w_i	r_i
1	2	31
2	3	47
3	1	14

15. (a) (i) The arrival at the counter in a bank occurs in accordance with a Poisson process at an average rate of 8 per hour. The duration of service of a customer has an exponential distribution with a mean of 6 minutes. Find the probability that

a) A customer has to wait.

b) There are 4 customers in the system.

c) A customer has to spend less than 15 minutes in the bank. (8)

(ii) A supermarket has 2 girls serving at the counters. Arrivals are considered to be Poisson with an average of 12 per hour, service time distribution is exponential with average of 6 minutes. Find

a) Average number of customers in the system.

b) Average time spent by a customer in the supermarket. (8)

Or

(b) (i) A petrol station has two pumps. Service time is 4 minutes. Arrival rate is 10 cars per hour. What proportion of time the pump remain idle? Find the waiting time of a customer in the queue? (8)

(ii) A television repairman finds that the time spent on his job has an exponential distribution with mean 30 minutes. If he repair sets in the order in which they came in, and if the arrival of the sets follows Poisson distribution approximately with an average rate of 10 per 8 hour day. What is the repairman's expected idle time each day? How many jobs are ahead of the average set just brought in? (8)

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