Unit-IV

4. a) Explain the queuing system.
   b) Explain Traffic intensity in a queue.
   c) Describe the customer's behaviour in a queue.
   d) In a super market, the average arrival rate of customer is 10 every 30 minutes following Poisson process. The average time taken by a cashier to list and calculate the customer's purchase is 2.5 minutes following exponential distribution what is the probability that the queue length exceeds 6? What is the expected time spent by a customer in the system?

OR

Drive the steady-state equations for the queuing model (M/M/1) : (∞/FCFS)

Unit-V

5. a) Describe inventory with economic order quantity?
   b) Explain holding cost, set-up cost and shortage cost in inventory.
   c) Distinguish between deterministic model and probabilistic model.
   d) The demand of an item is uniform at a rate of 25 units per month. The fixed cost is Rs 15 each time a production run is made. The production cost is Re 1 per item and the inventory carrying cost is Re 0-30 per item per month. If the shortage cost is Rs 1.50 per item per month. Determine how often to make a production run and of what size it would be?

OR

The demand for an item is 12000 per year and shortage are allowed. If the unit cost is Rs 15 and the holding cost is Rs 20 per year per unit. Determine the optimum total yearly cost the cost of placing one order is Rs. 6000 and the cost of one shortage is Rs 100 per year.

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Total No. of Questions : 5] *[Total No. of Printed Pages : 4*

Roll No .....

MCA-301

MCA. III Semester

Examination, December 2016

Computer Oriented Optimization Techniques

Time : Three Hours

Maximum Marks : 70

Note: i) Answer five questions. In each question part A, B, C is compulsory and D part has internal choice.

ii) All parts of each questions are to be attempted at one place.

iii) All questions carry equal marks, out of which part A and B (Max.50 words) carry 2 marks, part C (Max.100 words) carry 3 marks, part D (Max.400 words) carry 7 marks.

iv) Except numericals, Derivation, Design and Drawing etc.

Unit-I

1. a) Discuss the main characteristics of operation research.
   b) Give advantage of dual simplex method over simplex method.
   c) Write the dual of the following primal LPP.

Max. $Z = x_1 + 2x_2 + x_3$

Subject to $2x_1 + x_2 - x_3 \le 2$

$-2x_1 + x_2 - 5x_3 \ge -6$

$4x_1 + x_2 + x_3 \le 6$

$x_1, x_2, x_3 \ge 0$

   d) Solve the following LPP by simplex method

Min. $Z = x_1 - 3x_2 + 2x_3$

Subject to $3x_1 - x_2 + 3x_3 \le 7$

$-2x_1 + 4x_2 \le 12$

$-4x_1 + 3x_2 + 8x_3 \le 10$

$x_1, x_2, x_3 \ge 0$

OR

Solve by using Big-M method the following LPP

Max. $Z = -2x_1 - x_2$

Subject to $3x_1 + x_2 = 3$

$4x_1 + 3x_2 \geq 6$

$x_1 + 2x_2 \leq 4$

and $x_1, x_2 \geq 0$

Unit-II

2. a) What is an Assignment Problem? Give two applications.
   b) Define the dynamic programming.
   c) Find the Job sequence that minimises the total elapsed time (in hours) required to complete the following tasks on two machine.

Task	A	B	C	D	E	F	G	H	I
Machine I	2	5	4	9	6	8	7	5	4
Machine II	6	8	7	4	3	9	3	8	11

   d) Solve the following transportation problem starting with the initial solution obtained by VAM (Vogels Approximation Method)

		Destination D_1	D_2	D_3	D_4	Supply
Source	O_1	2	2	2	1	3
	O_2	10	8	5	4	7
	O_3	7	6	6	8	5
	Demand	4	3	4	4	15

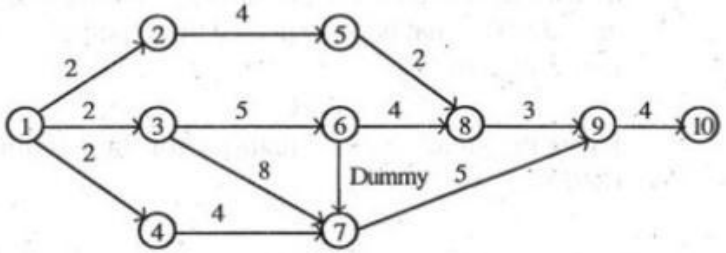
OR

Solve the following minimal assignment problem :

Job	Machines A	B	C	D	E
1	4	3	6	2	7
2	10	12	11	14	16
3	4	3	2	1	5
4	8	7	6	9	6

Unit-III

3. a) Define critical activity and critical path.
   b) What are the three common errors in the construction of network?
   c) Give main differences between PERT and CPM.
   d) Find the critical path and critical path time for the following network where nodes have been numbered according



to the Fulkerson's rule number along various activities represent the normal time (D_{ij}) required to finish that activity example activity (3) – (6) will take 5 days (months, weeks, hours depending on the time units).

OR

The following table shows the Jobs of a network along with their time estimates. The time estimates are in day's

Job	1-2	1-6	2-3	2-4	3-5	4-5	5-8	6-7	7-8
a (Optimistic time)	3	2	6	2	5	3	1	3	4
m (most likely time)	6	5	12	5	11	6	4	9	19
b (pessimistic time)	15	14	30	8	17	15	7	27	28

   i) Draw the project network
   ii) Find the critical path
   iii) Find the probability that the project is completed in 31 days.