

[4]

- c) A T.V. repairman finds that the time spent on his jobs has an exponential distribution with mean 30 minutes. If he repairs sets in the order in which they came in, if the arrival of sets is approximately Poisson 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?
- d) In a railway marshalling yard, goods train arrive at the rate of 30 trains per day. Assume that the inter arrival time follows an exponential distribution and the service time is also to be assumed as exponential with mean of 3-6 minutes, calculate :
- The probability that the yard is empty.
 - The average queue length assuming that the line capacity of the yard is 9 trains.

OR

Discuss the queueing model (M/M/S : N/FCFS).

Unit - V

- What is meant by Inventory?
- What are the different costs that are involved in the inventory problem?
- What are the main objectives of an Inventory model?
- The annual demand of an item is 3200 units. The unit cost is Rs. 6/- and inventory carrying charges 25% per annum. If the cost of one procurement is Rs. 150. Determine :
 - EOQ;
 - Number of orders per year;
 - Time between two consecutive order;
 - The optimal cost.

OR

The demand for an item is 18000 units per year. The holding cost is Rs. 1.20 per unit time and the cost of shortage is Rs. 5.00. The production cost is Rs. 400.00. Assuming that replacement rate is instantaneous determine the optimum order quantity.

Total No. of Questions :5]

[Total No. of Printed Pages : 4

Roll No

MCA-301**MCA. III Semester**

Examination, June 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.
- All parts of each question are to be attempted at one place.
 - 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.
 - Except numericals, Derivation, Design and Drawing etc.

Unit - I

- What are slack and surplus variables?
 - Give any two definitions of Operation Research.
 - Prove that Dual of Dual is Primal.
 - Solve the following linear programming problem by simplex method

$$\begin{aligned} \text{Maximize } & Z = 3x_1 + 2x_2, \\ \text{Subject to } & x_1 + x_2 \leq 4 \\ & x_1 - x_2 \leq 2 \\ & x_1, x_2 \geq 0 \end{aligned}$$

OR

A firm manufactures two type of products A and B and sells them at a profit of Rs. 2 on type A and Rs. 3 on type B. Each product is processed on two machines G and H. Type A requires one minute of processing time on G and two minutes on H; type B requires one minute on G and one minute on H. The machine G is available for not more than 6 hour 40 minutes while machine H is available for 10 hours during any working day. Formulate the problem as a linear programming problem.

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Unit - II

2. a) Define dynamic programming.
 b) What do you mean by degeneracy in a Transportation problem, also explain how degeneracy in a Transportation problem may be resolved?
 c) A company has six jobs A to F. All the jobs have to go through two machine M_1 and M_2 . The time required for the jobs on each machine in hours is given below. Find the optimum sequence that minimises the total elapsed time.

Job	A	B	C	D	E	F
Machine I	1	4	6	3	5	2
Machine II	3	6	8	8	1	5

- d) Solve the following transportation problem.

		Destination				Supply
		D_1	D_2	D_3	D_4	
Origin	O_1	11	13	17	14	250
	O_2	16	18	14	10	300
	O_3	21	24	13	10	400
	Demand	200	225	275	250	950

OR

Solve the following minimal assignment problem.

		Job				
		1	2	3	4	5
Machine	A	10	3	3	2	8
	B	9	7	8	2	7
	C	7	5	6	2	4
	D	3	5	8	2	4
	E	9	10	9	6	10

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Unit - III

3. a) What are the three common errors in the construction of Network?
 b) What is a dummy activity and when is it needed?
 c) Distinguish between CPM and PERT.
 d) The following table shows the Jobs of a network along with their time estimates.

Job	1-2	1-6	2-3	2-4	3-5	4-5	6-7	5-8	7-8
a days	1	2	2	2	7	5	5	3	8
m days	7	5	14	5	10	5	8	3	17
b days	13	14	26	8	19	17	29	9	32

Where a - optimistic time estimate

m - most likely time estimate

b - Pessimistic time estimate

Draw the project network and find the probability that the project is completed in 40 days.

OR

A small maintenance project consists of the following jobs whose precedence relationships is given below :

Job	1-2	1-3	2-3	2-5	3-4	3-6	4-5	4-6	5-6	6-7
Duration (days)	15	15	3	5	8	12	1	14	3	14

- i) Draw an arrow diagram representing the project.
 ii) Find the total float for each activity.
 iii) Find the critical path and the total project duration.

Unit - IV

4. a) Define Transient and Steady states in queueing theory.
 b) What are the basic characteristics of a queueing system?