Code No: R1631034 **R16** SET - 1

III B. Tech I Semester Supplementary Examinations, October/November - 2020

OPERATIONS RESEARCH

(Mechanical Engineering)

Time: 3 hours Max. Marks: 70

Note: 1. Question Paper consists of two parts (**Part-A** and **Part-B**)
2. Answer **ALL** the question in **Part-A**
3. Answer any **FOUR** Questions from **Part-B**

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PART – A (14 Marks)

1 a) What is its significance in Simplex method of solving LPP? [2M]

b) Give the mathematical formulation of an assignment problem. [3M]

c) What are the situations which make the replacement of items necessary? [2M]

d) Define a saddle point in a game. [2M]

e) Write the mathematical equation for EOQ. [3M]

f) Write the advantages and disadvantages of simulation. [2M]

PART – B (56 Marks)

2 a) State different types of models used in operation research. Explain any two in detail. [7M]

b) Solve the linear programming problem: [7M]

$$\text{Max } Z = 3X_1 + 2X_2$$
$$\text{Subjected to } 4X_1 + 3X_2 \leq 12$$
$$4X_1 - X_2 \leq 8$$
$$X_1, X_2 \geq 0.$$

3 a) Give the generalized mathematical formulation of an assignment problem. Give a comparative study of transportation problem and assignment problem. [7M]

b) Find the Total cost using North-west corner method. Also find the optimal solution. [7M]

	W1	W2	W3	W4	Capacity
F1	95	105	80	15	12
F2	115	180	40	30	7
F3	195	180	95	70	5
Requirement	5	4	4	11	

4 a) Discuss in brief, replacement procedure for the items that deteriorate with time. [7M]

b) A truck owner finds from his past records that the maintenance cost per year of a truck whose purchase price is Rs.8000, are given below: [7M]

Year	1	2	3	4	5	6	7	8
Maintenance cost	1000	1300	1700	2200	2900	3800	4800	6000
Resale Price	4000	2000	1200	600	500	400	400	400

Determine at what time it is profitable to replace the truck?

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5 a) Explain the theory of dominance in the solution of rectangular games. [7M]

b) At what average rate a clerk at a super market work in order to ensure a probability of 0.90 that the customer will not have to wait longer than 12 minutes? It is assumed that there is only one counter to which customers arrive in a Poisson fashion at an average rate of 15 per hour. The length of service by the clerk has an exponential distribution. [7M]

6 a) What are costs that are involved in carrying inventory? Explain them in detail. [7M]

b) A stockist purchases an item at the rate of Rs. 40 per piece from a manufacturer. 2,000 units of the item are required per year. What should be the order quantity per order if the cost per order is Rs.15 and the inventory charges per year are 20 per cent? [7M]

7 a) Solve the following LPP by dynamic programming: [8M]

$$\text{Minimize } Z = x_1+3x_2+4x_3$$
$$\text{Subject to } 2x_1+4x_2+3x_3 \geq 60,$$
$$3x_1+x_2+3x_3 \geq 90$$
$$x_1, x_2, x_3 \geq 0.$$

b) What are advantages of simulation? Explain Monte-Carlo simulation. [6M]

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