

**MANAGEMENT PROGRAMME**

**Term-End Examination**

**June, 2022**

**MS-051 : OPERATIONS RESEARCH**

*Time : 3 hours*

*Maximum Marks : 100*

*(Weightage : 70%)*

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**Note :** Attempt any **five** questions. All questions carry equal marks.

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1. Solve the equation graphically :

$$\text{Min } Z = 2500X + 3500Y$$

subject to

$$50X + 60Y \geq 2500$$

$$100X + 60Y \geq 3000$$

$$100X + 200Y \geq 7000$$

$$X, Y \geq 0$$

Also, find the minimum value.

2. A company has five salesmen and five sales territories. The sales territories are not equally rich in their sales potential nor do the salesmen have equal sales ability. The following table gives the expected sales in thousands per month for each salesman assigned to a given territory :

Territory \ Salesman	1	2	3	4	5
A	11	17	8	16	20
B	9	7	12	6	15
C	13	16	15	12	16
D	21	24	17	28	26
E	14	10	12	11	15

How should the territories be assigned so as to maximise the sales ?

3. What is Goal Programming ? Identify the areas of management in which it can be applied successfully.

4. A trader stocks a particular seasonal product at the beginning of the season and cannot reorder. The item costs him ₹ 25 each and he sells at ₹ 50 each. For any item that cannot be met on demand, the trader has estimated a goodwill cost of ₹ 15. Any item unsold will have a salvage value of ₹ 10. Holding cost during the period is estimated to be 10% of the price. The probability distribution of demand is as follows :

Units Stocked :	2	3	4	5	6
Probability of Demand, $P(D = Q)$	0.35	0.25	0.20	0.15	0.05

Determine the optimal number of items to be stocked.

5. Determine which course of action Player B will not use in the following game. Obtain the best strategies for both players and the value of the game.

		Player B		
		I	II	III
Player A	I	- 3	- 1	7
	II	4	1	- 2

6. A computer maintenance contract is to be signed by your company office. At an average, three computers per month go off-road due to various defects. The cost of a computer being unavailable is ₹ 8,000 per month. Two companies have bid for the contract. Alfa Computers have quoted at ₹ 3,000 per month whereas Beta Bytes has quoted at ₹ 5,000 per month for the contract. Enquiries reveal that Alfa Computers has an average repair capability of 5 computers per month and Beta Bytes can repair 6 computers per month at an average. Who should be given the contract ?

7. Write short notes on any *three* of the following :

- (a) Limitations of Operations Research
  - (b) Slack Variable and Surplus Variable
  - (c) Integer Programming
  - (d) Three Factors Affecting Inventory
  - (e) Limitation of Simulation
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