

**OPERATIONS RESEARCH**

Time: 3 hours

Max Marks: 60

Answer any FIVE questions

All questions carry equal marks

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1 Explain various models available in operations research. What are the limitations of operation research?

2 Solve the following linear programming problem using the result of its dual problem

$$\begin{aligned} \text{Minimize } Z_1 &= 24 X_1 + 30 X_2 \\ \text{Subject to } 2X_1 + 3X_2 &\geq 10 \\ 4X_1 + 9X_2 &\geq 15 \\ 6X_1 + 6 X_2 &\geq 20 \\ X_1 \text{ and } X_2 &\geq 0. \end{aligned}$$

3 The following matrix shows the processing time in days. Solve this assignment problem using Hungarian method

		Project				
		A	B	C	D	E
Man power	1	20	30	25	15	35
	2	25	10	40	12	28
	3	15	18	22	32	24
	4	29	08	34	10	40
	5	35	23	17	26	45

4 Six jobs are to be proceeded at three machines A, B and C in the order ABC. The time taken by each job on each machine is indicated below. Each machine can process only one job at a time.

Machines	Jobs					
	J1	J2	J3	J4	J5	J6
A	15	11	10	14	13	08
B	10	13	12	09	13	07
C	06	07	05	08	4.5	07

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- 5 What is dynamic programming? Explain the characteristics of dynamic programming.
- 6 With an example, explain the procedure involved for replacement of items that fail suddenly.
- 7 The pay off matrix with respect to player A is shown below. Solve it optimally:

		B	
		1	2
A	1	6	9
	2	8	4

- 8 The details of a product to be manufactured in a company are as follows:  
 $r = 40,000$  units/year,  $k = 80,000$  units/year,  $C_0 = \text{Rs } 300$  per set - up,  $C_C = \text{Rs } 30/\text{units/ year}$ , find the EOQ and cycle time.

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