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(2064)

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MCA 4th Semester Examination

Operational Research

MCA-403

Time : 3 Hours

Max. Marks : 60

The candidates shall limit their answers precisely within the answer-book (40 pages) issued to them and no supplementary/continuation sheet will be issued.

Note : Candidates are required to attempt five questions in all selecting one question from each of the sections A, B, C and D and all the subparts of the questions in section E.

SECTION - A

1. Solve, Maximize

$$Z = 5x_1 - 2x_2 + 3x_3$$

subject to constraints

$$2x_1 + 2x_2 - x_3 \geq 2$$

$$3x_1 - 4x_2 \leq 3$$

$$x_2 + 3x_3 \leq 5 \text{ and } x_1, x_2 \geq 0 \quad (12)$$

2. Use two phase simplex method to maximize $Z = 5x_1 + 3x_2$
subject to constraints

$$2x_1 + x_2 \leq 1$$

$$x_1 + 4x_2 \geq 6 \text{ and } x_1, x_2 \geq 0 \quad (12)$$

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SECTION - B

3. The following table lists the jobs of a network along with their time estimates

Jobs:	1-2	1-3	2-4	3-4	4-5	3-5
Optimistic time:	2	9	5	2	6	8
Pessimistic time:	14	15	17	8	12	20
Most likely time:	5	12	14	5	6	17

- (a) Draw the network.
 (b) Calculate the expected duration of each activity.
 (c) Find critical path. (12)
4. Use duality to solve the following linear programming problem

$$\text{Maximize } Z = 2x_1 + x_2$$

$$\text{Subject to } x_1 + 2x_2 \leq 10$$

$$x_1 + x_2 \leq 6$$

$$x_1 - x_2 \leq 2$$

$$x_1 - x_2 \leq 1 \text{ and } x_1, x_2 \geq 0 \quad (12)$$

SECTION - C

5. Determine a basic feasible solution to the following transportation problem

	D ₁	D ₂	D ₃	D ₄	Available
O ₁	6	1	9	3	70
O ₂	11	5	2	8	55
O ₃	10	12	4	7	90
Requirement	85	35	50	45	(12)

6. (a) What is a balanced transportation problem? What are its applications? (6)
- (b) What is a stepping stone transportation problem? (6)

SECTION - D

7. Solve the game whose pay off matrix is given by

		Player B			
		B ₁	B ₂	B ₃	B ₄
Player A	A ₁	5	-10	9	0
	A ₂	6	7	8	1
	A ₃	8	7	15	1
	A ₄	3	4	-1	4

(12)

8. (a) What are types of Inventory? Why they are maintained? Explain the various costs related to inventory. (6)
- (b) Describe briefly the EOQ concept. What are its limitations? Discuss. (6)

SECTION - E

9. (a) Briefly describe the advantages of operational research.
- (b) What is the use of MODI method?
- (c) State the rule of dominance in game theory.
- (d) What is significance of float in C.P.U.?
- (e) Give an example of first come, last served.
- (f) State two applications of a linear programming.
- (g) What is a critical path?
- (h) Explain ABC analysis. (8×1½=12)