

1790

MCA 4th Semester Examination
Operational Research (NS)
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 each of the sections A, B, C and D and all the subparts of the questions in section E.

SECTION - A

1. Use graphical method to solve the following linear programming problem.

$$\text{Minimize } Z = 20x + 10y$$

subject to the constraints

$$x+2y \leq 40, 3x+y \geq 30, 4x+3y \geq 60 \text{ \& } x, y \geq 0. \quad (12)$$

2. Show that the following linear programming problem maximize $z=3x+5y$ subject to the constraints $x-2y \leq 6, x \leq 10, y \geq 1$ and $x, y \geq 0$. has an unbounded solution. (12)

SECTION - B

3. A firm manufacturer two products x and y on machines I and II as shown below:

Machine	Product		Available Hours
	X	Y	
I	30	20	300
II	5	10	110
Profit per unit (Rs)	6	8	

[P.T.O.]

- (i) Formulate this problem as an LP problem.
- (ii) Determine the optimum product mix.
- (iii) Write the dual of this problem. (12)

4. A project has the following time schedule:

Activity	1-2	1-3	1-4	2-5	3-6	3-7	4-6	5-8	6-9	7-8	8-9
Time in weeks	2	2	1	4	8	5	3	1	5	4	3

Construct PERT network and compute

- (i) Total float for each activity.
- (ii) Critical path and its duration. (12)

SECTION - C

5. Determine the initial basic feasible solution to the following transportation problem using Vogel's approximation method:

		Destination				
		D ₁	D ₂	D ₃	D ₄	Supply
Source	S ₁	1	2	1	4	30
	S ₂	3	3	2	1	30
	S ₃	4	2	5	9	40
	Demand	20	40	30	10	

(12)

6. (i) Give an algorithm to solve an assignment problem. (6)
- (ii) Show that an assignment problem is a special case of a transportation problem. (6)

SECTION - D

7. Solve the following game graphically:

		Player B			
		B ₁	B ₂	B ₃	B ₄
Player A	A ₁	2	2	3	2
	A ₂	4	3	2	6

(12)

8. (i) Explain the concept of economic order quantity (EOQ). What are the basic ideas behind this concept? (6)
- (ii) Discuss the various costs involved in an inventory model. (6)

SECTION - E

9. (i) 'Linear programming has no real-life applications'? Do you agree with this statement? Discuss.
- (ii) Define iso-profit and iso-cost lines. How do these help us to obtain a solution to an LP problem.
- (iii) Discuss briefly 'duality' in linear programming.
- (iv) Explain the basic logic of arrow networks.
- (v) Discuss briefly the balanced transportation problem.
- (vi) Explain how to resolve degeneracy in a transportation problem.
- (vii) Explain two person zero-sum game, giving a suitable example.
- (viii) What will be the effect on the EOQ model with shortages if the shortage cost is very high? (8×1½=12)