[Total No. of Questions - 9] [Total No. of Printed Pages - 3]
(2124)

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.

   Minimize $Z = 20x + 10y$

   subject to the constraints

   $x+2y \leq 40$, $3x+y \geq 30$, $4x+3y \geq 60$ & $x, y \geq 0$. (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

Source		D_1	D_2	D_3	D_4	Supply
	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

Player A		B_1	B_2	B_3	B_4
	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)