35054

M.Sc. DEGREE EXAMINATION, NOVEMBER 2016.

THIRD SEMESTER

Mathematics

Paper IV — OPERATION RESEARCH

Time : Three hours Maximum : 75 marks

(No additional sheet will be supplied)

PART A — (5 × 5 = 25 marks)

Answer any FIVE questions.

Each question carries 5 marks.

Each answer should not exceed 1 page.

1. Explain graphical method.

2. Write the use of artificial variables with example.

3. Write the dual of the L.P.P :

   Minimize $z = 4x_1 + 6x_2 + 18x_3$

   Subject to the constraints

   $x_1 + 3x_2 \geq 3$, $x_2 + 2x_3 \geq 5$ and x_1, x_2, and $x_3 \geq 0$.

4. Explain North-West corner method.

5. Discuss about Hungarian assignment method.

6. Discuss about the travelling salesman problem.

7. Write the rules for determining a saddle point.

8. Solve the game and determine the value of the game.

$$\begin{array}{c} \\ P_1 \\ \\ \end{array} \begin{array}{c} P_2 \\ \begin{pmatrix} 5 & 1 \\ 3 & 4 \end{pmatrix} \end{array}$$

PART B — ($4 \times 12\frac{1}{2} = 50$ marks)

Answer ALL questions.

Each question carries 12½ marks.

Each answer should not exceed 5 pages.

9. Use simplex method to

Minimize $z = x_2 - 3x_3 + 2x_5$

Subject to the constraints

$3x_2 - x_3 + 2x_5 \leq 7$,

$-2x_2 + 4x_3 \leq 12$,

$-4x_2 + 3x_3 + 8x_5 \leq 10$,

$x_2 \geq 0$, $x_3 \geq 0$ and $x_5 \geq 0$.

Or

10. Use penalty method to

Maximize $z = 6x_1 + 4x_2$

Subject to the constraints

$2x_1 + 3x_2 \leq 30$, $3x_1 + 2x_2 \leq 24$, $x_1, x_2 \geq 3$, $x_1 \geq 0$ and $x_2 \geq 0$.

11. Write down the dual of the LPP and then solve

Max $z = 8x_1 + 4x_2$

Subject to the constraints

$4x_1 + 2x_2 \leq 30$, $2x_1 + 4x_2 \leq 24$, $x_1, x_2 \geq 0$.

Or

12. Obtain an initial basic feasible solution to the following T.P.

Warehouses	Stores				Availability
	I	II	III	IV	
A	5	1	3	3	34
B	3	3	5	4	15
C	6	4	4	3	12
D	4	–1	4	2	19
Requirement	21	25	17	17	80

13. (a) Explain the differences between a T.P and A.P.

(b) Discuss about the dual of the assignment problem.

Or

14. Solve the travelling salesman problem given by the following data :

$C_{12} = 20$, $C_{13} = 4$, $C_{14} = 10$, $C_{23} = 5$, $C_{34} = 6$

$C_{25} = 10$, $C_{35} = 6$, $C_{45} = 20$. where $C_{ij} = C_{ji}$.

and there is no route between cities i and j if a value for C_{ij} is not shown.

15. Solve the game whose payoff matrix is given below :

$$\begin{bmatrix} 9 & 3 & 1 & 8 & 0 \\ 6 & 5 & 4 & 6 & 7 \\ 2 & 4 & 3 & 3 & 8 \\ 5 & 6 & 2 & 2 & 1 \end{bmatrix}$$

Or

16. Solve the game by linear programming techniques :

	Player B		
Player A	1	−1	3
	3	5	−3
	6	2	−2


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