AI-1552 CV-19
M.A./M.Sc. (Final)
Term End Examination, 2020-21
MATHEMATICS
(Operations Research)
Paper - VIII

Time : Three Hours] **[Maximum Marks : 100**
[Minimum Pass Marks : 36

Note : Answer any five questions. All questions carry equal marks.

1. (a) Define Or and discuss its scope.
(b) Solve the L.P.P.
MaxZ = $3x_1 + 5x_2 + 4x_3$
s.t. $2x_1 + 3x_2 \le 8$
$2x_2 + 5x_3 \le 10$
$3x_1 + 2x_2 + 4x_3 \le 15$
and $x_1, x_2, x_3 \ge 0$

2. State and prove fundamental Theorem of Linear Programming

3. Solve following L.P.P. by the dual simplex Algorithm
MinZ = $x_1 + 2x_2 + 3x_3$
s.t. $2x_1 - x_2 + x_3 \ge 4$
$x_1 + x_2 + 2x_3 \le 8$
$x_2 - x_3 \ge 2$
and $x_1, x_2, x_3 \ge 0$

4. For the following L.P.P.
Min = $\lambda x_1 - \lambda x_2 - x_3 + x_4$
s.t. $3x_1 - 3x_2 - x_3 + x_4 \ge 5$
$2x_1 - 2x_2 + x_3 - x_4 \le 3$
and $x_1, x_2, x_3, x_4 \ge 0$
Find the range of λ over which the solution remain bsic feasible and optional

5. Solve the following transportation problem

From	To			Supply
	1	2	3	
1	2	7	4	5
2	3	3	1	8
3	5	4	7	7
4	1	6	2	14
Demand	7	9	18	24

6. (a) Write a note on dynamic programming.
(b) Solve by dynamic programming method.
Max Z = $x_1 . x_2 . x_3$
s.t. $x_1 + x_2 + x_3 = 5$
$x_1, x_2, x_3 \ge 0$

7. (a) Solve the game by graphical method.

$$A \begin{vmatrix} 2 & -1 & 5 & -2 & 6 \\ -2 & 4 & -3 & 1 & 0 \end{vmatrix}$$

(b) Use the concept of dominance to solve the game whose pay – off matrix to the player A is

	B		
	I	II	III
	1	7	2
A	6	2	7
	5	1	6

8. Draw a Network diagram on the basis of the following data

Activity	Duration(days)
1 – 2	2
1 – 4	2
1 – 7	1
2 – 3	4
3 – 6	1
4 – 5	5
4 – 8	8
5 – 6	4
6 – 9	3
7 – 8	3
8 – 9	2
9 – 10	2

Find the critical path, total duration and slack times.

9. Write a note on
(i) Petroleum refinery operations
(ii) Input/Output analysis
(iii) Ieontief system
(iv) Decomposable economics

10. Write the dual of the following L.P.P. and solve. Find the solution of primal by final simplex table of dual problem.

$$\text{Max}Z = 30x_1 + 23x_2 + 29x_3$$
$$\text{s.t.} \quad 6x_1 + 5x_2 + 3x_3 \leq 26$$
$$4x_1 + 2x_2 + 5x_3 \leq 7$$
$$\text{and} \quad x_1, x_2, x_3 \geq 0$$