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Reg. No. : .....

Name : .....

Third Semester B.B.A. LL.B. (Five Year Integrated) Degree Examination, OCTOBER 2022.

Paper III – OPERATIONS RESEARCH

(2013 Admission onwards)

Time : 3 Hours Max. Marks : 80

I. Answer **any five** of the following. Each question carries **2** marks. Answer should not exceeds **50** words each.

1. Explain the transpose of a matrix with example.
2. What is the feasible solution?
3. What is the assumption of additivity in linear programming?
4. Define a Dual problem.
5. Distinguish slack variables and surplus variables in simplex method.
6. Define ad-joint of a matrix.
7. Define Linear Programming.
8. What is mean by the Rank of a matrix?

(5 × 2 = 10 Marks)

II. Answer **any four** of the following. Each question carries **4** marks. Answer should not exceeds **120** words each.

1. What are the essential ingredients of a linear programming problem.
2. Write a note on Lowest Cost Entry Method.

P.T.O.

3. Find the rank of the matrix $A = \begin{bmatrix} 2 & 0 & 5 \\ 3 & -7 & 3 \\ 1 & -4 & 6 \end{bmatrix}$.

4. Explain the simplex method to linear programming problem.

5. Let $P = \begin{bmatrix} 0 & 1 \\ 2 & 3 \end{bmatrix}$ and $Q = \begin{bmatrix} -1 & 2 \\ 4 & 3 \end{bmatrix}$ find PQ.

6. Explain the properties of the transpose of a matrix.

(4 × 4 = 16 Marks)

III. Answer **any four** of the following. Each question carries **6** marks.

1. Explain the properties of determinants with examples.

2. Find the ad-joint of the matrix $A = \begin{bmatrix} 0 & 1 & 2 \\ 1 & 2 & 3 \\ 3 & 1 & 1 \end{bmatrix}$.

3. Write a note on Saddle point solution.

4. What are the advantages and limitations of linear programming models?

5. Find the initial feasible solution to the following transportation problem by lowest cost entry method.

	W1	W2	W3	
F1	2	7	4	5
F2	3	3	1	8
F3	5	4	7	7
F4	1	6	2	14
	7	9	18	

6. Explain the sequencing problem in detail.

(4 × 6 = 24 Marks)

IV. Answer **any three** of the following. Each question carries **10** marks.

1. Solve the following LPP using graphical method

   Maximize $Z = 60X_1 + 40X_2$

   Subject to,

   $2X_1 + X_2 \leq 60$

   $X_1 \leq 25$

   $X_2 \leq 35$

   $X_1, X_2 \geq 0$

2. What are transportation problems? Explain different methods for finding initial solution for it.

3. Discuss the network analysis in detail.

4. Determine which of the following two-person zero-sum games are strictly determinable and fair. Give optimum strategies for each player in the case of strictly determinable games.

   Player B

   (a) Player A $\begin{bmatrix} 5 & 0 \\ 0 & 2 \end{bmatrix}$

   Player B

   (b) Player A $\begin{bmatrix} 0 & 2 \\ -1 & 4 \end{bmatrix}$

5. Solve the following simultaneous equations using Cramer's Rule

   $5x - 6y + 4z = 15$

   $7x + 4y - 3z = 19$

   $2x + y + 6z = 46$

(3 × 10 = 30 Marks)