

18A705

B. Sc. (Hons.)-M. Sc. Dual Degree EXAMINATION, 2021

(First Semester)

(B Scheme) (Main & Re-appear)

(MATHS)

DMT223B

OPERATIONS RESEARCH-I

Time : 2½ Hours]

[Maximum Marks : 75

Before answering the question-paper candidates should ensure that they have been supplied to correct and complete question-paper. No complaint, in this regard, will be entertained after the examination.

Note : Attempt *Four* questions in all. All questions carry equal marks.

1. Describe the term Operation Research. Explain limitations, scope and applications of OR.

2. (a) Solve the following problem graphically :

$$\text{Max. } Z = 5x + 2y,$$

Subject to constraints :

$$5x + 5y \leq 15$$

$$10x + 4y \leq 10$$

$$x, y \geq 0$$

(b) Describe the methodology of OR.

3. By using simplex method, find the solution of given LPP :

$$\text{Max. } Z = 5x_1 + 3x_2,$$

Subject to constraints :

$$\begin{aligned}x_1 + x_2 &\leq 2 \\5x_1 + 2x_2 &\leq 10 \\3x_1 + 8x_2 &\leq 10 \\x_1, x_2 &\geq 0\end{aligned}$$

4. Use the (Big-M) method to solve the given LPP :

$$\text{Min. } Z = 5x_1 + 3x_2,$$

Subject to constraints :

$$\begin{aligned}2x_1 + 4x_2 &\leq 12 \\2x_1 + 2x_2 &= 10 \\5x_1 + 2x_2 &\geq 10 \\x_1, x_2 &\geq 0\end{aligned}$$

5. Using Dual simplex method, solve the given LPP :

$$\text{Max. } z = -3x_1 - x_2,$$

subject to constraints :

$$\begin{aligned}x_1 + x_2 &\geq 1 \\2x_1 + 3x_2 &\geq 2 \\x_1, x_2 &\geq 0\end{aligned}$$

6. Determine the optimal transportation plan from the following table :

Plant	W_1	W_2	W_3	W_4	Availability
F_1	11	20	7	8	50
F_2	21	16	10	12	40
F_3	8	12	18	9	60
Requirement	30	25	35	40	

7. Solve the following assignment problem :

	I	II	III	IV	V	(Man)
A	1	3	2	3	6	
B	2	4	3	1	7	
(Task) C	5	6	3	4	5	
D	3	1	4	3	6	
E	1	5	6	6	2	

8. Players A and B play a game in which each has three coins, a 5P, a 10P and a 20P. Each selects a coin without the knowledge of the others choice. If the sum of the coins is an odd amount, then A wins B's coin. But, if the sum is even, then B wins A's coin. Find the best strategy for each player and the values of the game.

9. (a) What are the advantages and limitations of graphical method ?

(b) Find all the basic feasible solution of given LPP :

$$\text{Min. } Z = x + y,$$

Subject to constraints :

$$x + y \leq 4$$

$$x - y \geq 5$$

$$x, y \geq 0$$

(c) Explain transportation problem.

(d) Write brief note on Assignment problem.

(e) Convert the given LPP in to its dual form :

$$\text{Max. } Z = 2x_1 + 3x_2,$$

Subject to constraints :

$$x_1 - x_2 \geq 1$$

$$x_1 + 2x_2 \leq 4$$

$$x_1, x_2 \geq 0$$