5. Use Big-M Method to solve the given LPP :

Maximize $Z = 5x_1 + 3x_2$

Subject to constraints

$$2x_1 + 4x_2 \leq 12$$
$$2x_1 + 2x_2 = 10$$
$$5x_1 + 2x_2 \geq 10$$
$$x_1, x_2 \geq 0$$

Unit III

6. Using Dual Simplex Method solve :

Maximize $Z = x_1 + 2x_2 + 3x_3$

Subject to

$$2x_1 - x_2 + x_3 \geq 4$$
$$x_1 + x_2 + 2x_3 \leq 8$$
$$x_2 - x_3 \geq 2$$
$$x_1, x_2, x_3 \geq 0$$ **15**

7. Determine the optimal transportation plan and least transportation cost for the following table : **15**

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	70
Requirement	30	25	35	40	

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Dual Degree B. Sc. (Hons.)/ M. Sc. Mathematics

EXAMINATION, Dec. 2018

(First Semester)

(Main Only)

MATHS

DMT223B

OPERATIONS RESEARCH–I

Time : 3 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 : The question paper consists four Units and one compulsory question. The student should attempt a total *Five* questions, by selecting *one* question from each Unit and the compulsory question.

Compulsory Question

1. (a) Write the steps of formulation of a linear programming problem. **3**

   (b) Explain various terms like basic solution, feasible solution and degeneracy in a linear programming problem. **3**

   (c) Write the principle of duality and convert the given LPP into its dual form : **3**

   Maximize Z = $5x_1 + 3x_2$

   Subject to

   $$x_1 + x_2 \leq 2$$
   $$5x_1 + 2x_2 \leq 10$$
   $$3x_1 + 8x_2 \leq 12$$
   $$x_1, x_2 \geq 0$$

   (d) What do you mean by an assignment problem ? Explain with the help of a suitable examples. **3**

   (e) Write the rules of dominance used to reduce the size of the payoff matrix in game theory. **3**

Unit I

2. Define the scope, methodology and applications of operation research. **15**

3. Solve the given LPP by graphically method :

   Maximize Z = $20x_1 + 10x_2$

   Subject to constraints

   $$x_1 + 2x_2 \leq 40$$
   $$3x_1 + x_2 \geq 30$$
   $$4x_1 + 3x_2 \geq 60$$
   $$x_1, x_2 \geq 0$$

   Also write the limitations of graphical method. **15**

Unit II

4. Solve the following LPP by simplex method :

   Maximize Z = $x_1 - 3x_2 + 3x_3$

   Subject to

   $$3x_1 - x_2 + 2x_3 \leq 7$$
   $$2x_1 + 4x_2 \geq -12$$
   $$-4x_1 + 3x_2 + 8x_3 \leq 10$$
   $$x_1, x_2, x_3 \geq 0$$ **15**

Unit IV

8. Solve the following minimal assignment problem : **15**

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

9. Using algebraic method solve the game whose payoff matrix is given below :

Player A \ Player B	B_1	B_2	B_3	B_4
A_1	3	2	4	0
A_2	3	4	2	4
A_3	4	2	4	0
A_4	0	4	0	8

Unit IV

8. Solve the following minimal assignment problem : **15**

Task \ Man	I	II	III	IV	V
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A_3	4	2	4	0
A_4	0	4	0	8