

201112

M. Sc. (Third Semester) Examination, Dec. 2021

(For Regular/ATKT/Ex. Students)

MATHEMATICS

Paper : V - Group-IV(I)

(Operations Research-I)

Time Allowed : Three hours

Maximum Marks : 42

Note : Attempt questions of all three sections as directed. Distribution of marks is given with sections.

Section-'A'

(Objective Type Questions) 7×1=7

Note : Attempt all the following questions. Each question carries 1 mark.

. Choose the correct answer :

- (i) The first country to use Operations Research method to solve problem is :
- (a) India
 - (b) U.K.
 - (c) U.S.A.
 - (d) China
- (ii) The objective of Operations Research is :
- (a) To find new method of solving problem
 - (b) To derive formula
 - (c) Optimal utilization of existing resources
 - (d) None of these
- (iii) The model which gives physical or visual representation of the problem is :
- (a) Iconic model
 - (b) Analogue model
 - (c) Static model
 - (d) Symbolic model

- (iv) When we solve L.P. model graphically the area bounded by the constraints is called :
- Unbounded solution
 - Feasible region
 - Infeasible region
 - None of these
- (v) The key column indicates :
- Incoming variable
 - Outgoing variable
 - Dependent variable
 - Independent variable
- (vi) The cost coefficient of artificial surplus variable is :
- 0
 - 1
 - M
 - None of these
- (vii) If the primal problem is maximization problem, then the dual will be :
- Maximization problem

- Minimization problem
- Mixed problem
- None of these

Section-'B'

(Short Answer Type Questions) 5×2=10

Note : Attempt all the five questions One question from each unit is compulsory Each question carries 2 marks.

Unit-I

2. What are the scope of Operations Research?

Or

Write the characteristics of Operations Research.

Unit-II

3. Explain the phases of Operations Research.

Or

Write the characteristics of a good model.

Unit-III

4. Explain the mathematical formulation of Linear Programming Problem.

Or

Write the matrix form of the linear programming problem.

Unit-IV

5. Explain artificial variable in Linear Programming Problem.

Or

Explain Degeneracy.

Unit-V

6. What is Duality?

Or

Write the Mathematical formulation of Dual Problem.

Section-'C'

(Long Answer Type Questions) 5×5=25

Note : Attempt all the five questions. One question from each unit is compulsory. Each question carries 5 marks.

Unit-I

7. Describe origin and development of operations research.

Or

Explain the scope of Operations Research in Management.

Unit-II

8. Explain the uses and limitation of Operations Research.

Or

Write the advantages and limitation of a model in Operations Research.

Unit-III

9. Explain the Graphical method of solving the linear programming problem.

Or

Solve the following LPP by graphical method :

$$\text{Maximize } z = 3x_1 + 2x_2$$

$$\text{Subject to } -2x_1 + x_2 \leq 1$$

$$x_1 \leq 2$$

$$x_1 + x_2 \leq 2$$

$$\text{Whereas } x_1, x_2 \geq 0$$

Unit-IV

10. Solve the following L.P.P. by simplex method :

$$\text{Maximize } z = 5x_1 + 3x_2$$

Subject to constraints

$$x_1 + x_2 \leq 2$$

$$5x_1 + 2x_2 \leq 10$$

$$3x_1 + 8x_2 \leq 12$$

$$\text{and } x_1, x_2 \geq 0$$

Or

Solve the following L.P.P. by BIG-M method

$$\text{Maximize } z = 3x_1 + 2x_2$$

Subject to constraints

$$2x_1 + x_2 \leq 2$$

$$3x_1 + 4x_2 \geq 12$$

$$\text{and } x_1, x_2 \geq 0$$

Unit-V

11. Explain the important characteristics of Duality.

Or

Prove that dual of the dual is the primal.

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