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AD-617(A)

M. Sc. (Third Semester) Special Examination, 2019

(For Regular/ATKT Students)

MATHEMATICS

(Operations Research-I)

Time Allowed : Three hours

Maximum Marks : 42

Note : *All section as directed.*

Section-'A'

(Objective Type Questions) **7×1=7**

Note : *Attempt all questions. Each questions carries 1 marks.*

1. Choose the correct answer :

(ii) The first country to use Operation Research to solve problem is :

(a) India

(b) China

(c) U. K.

(d) U. S. A.

(ii) While solving LP model graphically the area bounded by the constraints is called :

(a) Unbounded solution

(b) Feasible solution

(c) Infeasible region

(d) None

(iii) The key column indicates :

(a) Incoming vector

(b) Outgoing vector

(c) Cross vector

(d) None

(iv) To convert ≤ type of inequality into equations we have :

(a) add slack variables

(b) add surplus variables

(c) subtract slack variables

(d) subtract surplus variables

(v) When the elements of net evaluation row of simplex tables are equal the situation is known as :

(a) Tie

(b) Degeneracy

(c) Break

(d) None

(vi) Dual of the dual is :

(a) Equal

(b) Primal

(c) Primal dual

(d) Dual

(vii) If the primal has an unbounded solution then the dual has :

(a) Optimal solution

(b) No solution

(c) Bounded solution

(d) None

Section-'B'

(Short Answer Type Questions) 5×2=10

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

Unit-I

2. Write the four definitions of Operations Research.

Or

Write the origin and development of OR.

Unit-II

3. Write the limitation of OR.

Or

Write the advantages of OR.

Unit-III

Write the mathematical formulation of linear programming problem.

Or

Write the matrix form of Linear programming problem.

Unit-IV

5. Define slack variables, surplus variable and feasible solution.

Or

What do you understand by degeneracy. Explain.

Unit-V

6. What is the difference between dual and primal problem.

Or

Write the dual of the following linear programming problem

Maximize $Z = x_1 - 2x_2 + x_3$

Subject to the constraints :

$$2x_1 + x_2 - x_3 \leq 2$$

$$2x_1 - x_2 + 5x_3 \leq 6$$

$$4x_1 + x_2 + x_3 \leq 6$$

and $x_1, x_2, x_3 \geq 0$

Section-'C'

(Long Answer Type Question) **5×5=25**

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

Unit-I

7. Write the scopes of Operation Research in different field.

Or

Explain main characteristics of Operation Research.

Unit-II

8. Write the different types of models in OR. Write the general method for solving these OR models.

Or

Explain difference phases of Operations Research.

Unit-III

9. Solve graphically :

Minimize $Z = 6x_1 + 14x_2$

Such that

$$5x_1 + 4x_2 \geq 60$$

$$3x_1 + 7x_2 \leq 84$$

$$x_1 + 2x_2 \geq 18$$

$$x_1, x_2 \geq 0$$

Or

Solve the following Linear Programming problem graphically :

Maximize $Z = 5x_1 + 7x_2$

Subject to the constraints :

$$x_1 + x_2 \leq 4$$

$$3x_1 + 8x_2 \leq 24$$

$$10x_1 + 7x_2 \leq 35$$

$$x_1, x_2 \geq 0$$

Unit-IV

10. Solve by Big *M* method :

Minimize $Z = -3x_1 + x_2$

Subject to the constraints :

$$2x_1 + x_2 \geq 2$$

$$x_1 + 3x_2 \leq 2$$

$$x_2 \leq 4 \qquad x_1, x_2 \geq 0$$

Or

Solve by simplex method :

Maximize $Z = 3x_1 + 2x_2$

Subject to the constraints :

$$x_1 + x_2 \leq 4$$

$$x_1 - x_2 \leq 2$$

$$x_1 \geq 0, \; x_2 \geq 0$$

Unit-V

11. State and prove weak duality theorem.

Or

By the use of principle of duality. Solve the following linear programming problem :

Maximize $Z = 4x_1 + 2x_2$

Subject to the constraints :

$$-x_1 - x_2 \leq -3$$

$$-x_1 + x_2 \leq -2$$

$$x_1, x_2 \geq 0$$