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Total No. of Questions : 11] [Total No. of Printed Pages : 8

M.A./M.Sc. 3rd Semester Special (ATKT) Examination July, 2017

SP–154

MATHEMATICS
(Operations Research-I)
(Optional Paper)
Paper : VIII

Time : 3 Hours] [Maximum Marks : Reg. = 85, Pvt. = 100

Note :– Attempt all questions.

Section–A

(Objective Type Questions) 2×5=10

1. Choose the correct answer.

(i) Operation research is the outcome of :

(a) National emergency

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(b) Political problems

(c) Combined efforts of talents of all field

(d) Economics and Engineering

(ii) The model which gives physical or visual representation of the problem is :

(a) Analogue model

(b) Static model

(c) Iconic model

(d) Symbolic model

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

(a) Unbounded solution

(b) Infeasible region

(c) Feasible solution

(d) None of these

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(iv) The key column Indicates :

(a) Outgoing variable

(b) Incoming variable

(c) Independent variable

(d) Dependent variable

(v) Primal of a dual is :

(a) Primal

(b) Dual

(c) Prime dual

(d) Prime primal

Section–B

(Short Answer Type Questions) 5×5=25

2. Define operation research and discuss the scope of O.R.

Or

What are the areas in which OR techniques can be applied ?

3. Describe models used in operation research.

Or

Give the various advantages and limitations of operation research.

4. Explain mathematically formulation of a L.P.P.

Or

Explain graphical solution method.

5. Explain the problem of degeneracy.

Or

Explain Big-M method.

6. Prove that the dual of the dual is the primal.

Or

Explain the advantages and applications of duality.

Section–C

(Long Answer Type Questions) 10×5=50

7. Explain characteristics of operation research.

Or

Discuss the origin and development of operation research.

8. Explain phases of operation research.

Or

Explain the properties of linear programming model.

9. Solve graphically :

Minimize :

$$Z = 6x_1 + 14x_2$$

Such that :

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

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

$$x_1 + 2x_2 \geq 18$$

and $$x_1, x_2 \geq 0$$

Or

Use Big-M method to solve the following L.P.P. :

Minimize

$$Z = 2x_1 + x_2$$

Subject to :

$$3x_1 + x_2 = 3$$

$$4x_1 + 3x_2 \geq 6$$

$$x_1 + 2x_2 \leq 3$$

$$x_1, x_2 \geq 0$$

11. Construct the dual of the problem :

Minimize :

$$Z = 2x_2 + 5x_3$$

Subject to :

$$x_1 + x_2 \geq 2$$

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

$$x_1 - x_2 + 3x_3 = 4$$

and $$x_1, x_2, x_3 \geq 0$$

Or

Prove that if a linear programming problem has an optimal solution, so does its dual, and the respective objective functions are equal.