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RAN-2003000205030014**T.Y.B.Sc. (Sem. V) Examination October - 2023****Operation Research-I-EG-5001 (Mathematics)****Set - III****[Total Marks: 50****सूचना : / Instructions**

(१)

नीचे दशविवेक निशानीवाणी विगतो उत्तरवली पर अवश्य लपववी.
Fill up strictly the details of signs on your answer book

Name of the Examination:

T.Y.B.Sc. (Sem. V)

Name of the Subject :

Operation Research-I-EG-5001 (Mathematics) Set - III

Subject Code No.: 2003000205030014

Seat No.:

Student's Signature

- (1) All questions are compulsory.
(2) Figures to the right indicate marks of the corresponding question.

Q:1 (a) Answer the following. (Any three)**06**

1. Define: Basic Solution, Basic feasible solution.
2. State the general mathematical form of Linear Programming Problem.
3. Define: Unbounded solution, Optimum Basic feasible solution.
4. State the Matrix representation of Linear Programming Problem.
5. Define: Slack Variable, Degenerate Basic feasible solution.

(b) Write the dual of the following LPP.(Any One)**04**

1. Obtain the dual of the following LPP:

$$\text{Min } Z = 3x_1 - 2x_2 + 4x_3$$

Subject to constraints,

$$5x_1 + 5x_2 + 4x_3 \geq 7$$

$$6x_1 + x_2 + 3x_3 \geq 4$$

$$7x_1 - 2x_2 - x_3 \leq 10$$

$$x_1 - 2x_2 + 5x_3 \geq 3$$

$$4x_1 + 7x_2 - 2x_3 \geq 2$$

$$\text{and } x_1, x_2, x_3 \geq 0$$

2. Write dual of the following primal LPP:

$$\text{Max } Z = 3x_1 + x_2 + 2x_3 - x_4$$

Subject to Constraints,

$$2x_1 - x_2 + 3x_3 + x_4 = 1$$

$$x_1 + x_2 - x_3 + x_4 = 3$$

and $x_1, x_2 \geq 0$; x_3, x_4 are unrestricted in signs.

Q:2 Answer the following. (Any one)

10

1. Solve the following LPP using Graphical Method:

$$\text{Max } Z = 30x_1 + 40x_2$$

Subject to constraints,

$$4x_1 + 2x_2 \leq 100$$

$$4x_1 + 6x_2 \leq 180$$

$$x_1 + x_2 \leq 40$$

$$x_1 \leq 20$$

$$x_2 \geq 10$$

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

2. Solve the following LPP using Graphical Method:

$$\text{Max } Z = 0.40x_1 + 0.30x_2$$

Subject to constraints,

$$2x_1 + x_2 \leq 1000$$

$$x_1 + x_2 \leq 800$$

$$x_1 \leq 400$$

$$x_2 \leq 700$$

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

Q:3 Answer the following. (Any one)**10**

1. Solve the following LPP using Simplex Method:

$$\text{Max } Z = 40x_1 + 35x_2 + 30x_3$$

Subject to constraints,

$$2x_1 + 3x_2 + 2x_3 \leq 120$$

$$3x_1 + 2x_2 + 4x_3 \leq 100$$

$$4x_1 + 3x_2 + x_3 \leq 160$$

$$x_1 + x_2 + x_3 \leq 40$$

$$\text{and } x_1, x_2, x_3 \geq 0$$

2. Solve the following LPP using Simplex Method:

$$\text{Max } Z = 3x_1 + 2x_2 + 5x_3$$

Subject to constraints,

$$x_1 + 2x_2 + x_3 \leq 430$$

$$3x_1 + 2x_3 \leq 460$$

$$x_1 + 4x_2 \leq 420$$

$$\text{and } x_1, x_2, x_3 \geq 0$$

Q:4 Answer the following. (Any one)**10**

1. Solve the following LPP using Two Phase Method:

$$\text{Min } Z = 7.5x_1 - 3x_2$$

Subject to constraints,

$$3x_1 - x_2 - x_3 \geq 3$$

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

$$\text{and } x_1, x_2, x_3 \geq 0$$

2. Solve the following LPP using Big-M Method:

$$\text{Min } Z = 3x_1 + 2x_2$$

Subject to constraints,

$$5x_1 + x_2 \geq 10$$

$$2x_1 + 2x_2 \geq 12$$

$$x_1 + 4x_2 \geq 10$$

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

Q:5 Answer the following. (Any one)

10

1. Solve the following LPP using Two Phase Method:

$$\text{Min } Z = 5x_1 + 8x_2$$

Subject to

$$3x_1 + 2x_2 \geq 3$$

$$x_1 + 4x_2 \geq 4$$

$$x_1 + x_2 \leq 5$$

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

2. Solve the following LPP using Big-M Method:

$$\text{Min } Z = 2x_1 + x_2$$

Subject to constraints,,

$$3x_1 + x_2 = 3$$

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

$$x_1 + 2x_2 \leq 4$$

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