



RAN-2503000505063002

T. Y. B. Sc. (Sem. - V) Examination October - 2025
MH-SEC-5002 : Operation Research - I (Mathematics)

Time: 1 Hour]

[Total Marks: 25

સૂચના : / Instructions

- (1) ઉપરોક્ત દર્શાવેલ વિગતો ઉત્તરવહી પર અવશ્ય લખવી.
Fill up strictly the above details on your answer book.
- (2) All questions are compulsory.
- (3) Figures to the right indicate marks of the corresponding question.

Seat No.:

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Student's Signature

Q. 1. Answer the following. (Any Five)

(05)

1. Define : Objective function.
2. State the general mathematical form of Linear Programming Problem.
3. Define Degenerate Basic feasible solution.
4. Define Slack Variable.
5. Define Artificial Variable.
6. Obtain the Dual Linear programming problem for the following problem.

$$\text{Min } Z = 7x_1 - 3x_2$$

Subject to constraints

$$10x_1 - 4x_2 \leq 12$$

$$3x_1 + 5x_2 \geq -1$$

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

Q. 2. Answer the following. (Any Two)

(10)

1. Obtain the Dual Linear programming problem for the following problem:

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

Subject to constraints

$$3x_1 + 5x_2 + 4x_3 \geq 7$$

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

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

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

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

and $x_1, x_2 \geq 0$; x_3 is unrestricted in sign.

2. Obtain the Dual Linear programming problem for the following problem:

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

Subject to constraints

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

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

$$2x_1 + 3x_2 + 4x_3 = 1$$

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

3. Obtain the Dual Linear programming problem for the following problem:

$$\text{Min } Z = x_1 + x_2 + x_3$$

Subject to constraints

$$x_1 - 3x_2 + 4x_3 = 5$$

$$x_1 - 2x_2 \leq 3$$

$$2x_2 - x_3 \geq 4$$

and $x_1, x_2 \geq 0$; x_3 is unrestricted in sign.

Q. 3. Answer the following. (Any Two)

(10)

1. Solve the following LPP using Graphical Method:

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

Subject to constraints,

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

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

$$x_1 + x_2 \leq 40$$

$$x_1 \leq 20$$

$$x_2 \geq 1$$

and $x_1, x_2 \geq 0$

2. Solve the following LPP using Graphical Method:

$$\text{Max } Z = 1800x_1 + 1200x_2$$

Subject to constraints,

$$2x_1 + 3x_2 \leq 60$$

$$2.4x_1 + 1.2x_2 \leq 48$$

$$x_1 \leq 18$$

$$x_2 \leq 18$$

and $x_1, x_2 \geq 0$

3. Solve the following Linear programming problem, using Graphical method.

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

Subject to constraints

$$x_1 + 2x_2 \leq 10$$

$$x_1 + x_2 \leq 6$$

$$x_1 - x_2 \leq 2$$

$$x_1 - 2x_2 \leq 1$$

and $x_1, x_2 \geq 0$