

RAN-2503000505063002

T.Y.B.Sc. (Sem.-V) Examination March - 2026
Operation Research-I (Mathematics) (MH-SEC-5002)

[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.: Student's Signature
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Q.1 Answer the following. (Any Five)

05

1. Obtain the Dual Linear programming problem for the following problem.
 $Max Z = 5x_1 + x_2$
Subject to constraints
 $3x_1 - 4x_2 \leq 8$
 $2x_1 + 3x_2 \geq -5$
and $x_1, x_2 \geq 0$
2. Define Basic feasible solution.
3. Define Surplus Variable.
4. State the Matrix representation of Linear Programming Problem.
5. Define Artificial Variable.
6. Define : Objective function.

Q.2 Answer the following. (Any Two)

10

1. Obtain the Dual Linear programming problem for the following problem.
 $Min Z = 2x_1 + 3x_2 + 4x_3$
Subject to constraints
 $2x_1 + 3x_2 + 5x_3 \geq 2$
 $3x_1 + x_2 + 7x_3 = 3$
 $x_1 + 4x_2 + 6x_3 \leq 5$
and $x_1, x_2 \geq 0$; x_3 is unrestricted in sign.
2. Obtain the Dual Linear programming problem for the following problem.
 $Min Z = x_1 + x_2 + x_3$
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.

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

$$\text{Max } Z = 2x_1 + 3x_2 + x_3 + 5x_4$$

Subject to constraints

$$4x_1 + 3x_2 + x_3 + 7x_4 = 6$$

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

$$3x_2 + 4x_3 + 3x_4 = 10$$

$$x_1 + 2x_2 + 5x_3 \leq 4$$

and $x_1, x_3 \geq 0$; x_2, x_4 is unrestricted in sign.

Q.3 Answer the following. (Any Two)

10

- 1 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 $x_1, x_2 \geq 0$

- 2 Solve the following Linear programming problem, using Graphical method.

$$\text{Min } Z = 20x_1 + 40x_2$$

Subject to constraints

$$36x_1 + 6x_2 \geq 108$$

$$3x_1 + 12x_2 \geq 36$$

$$20x_1 + 10x_2 \geq 100$$

and $x_1, x_2 \geq 0$

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

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

Subject to constraints

$$2x_1 + x_2 \leq 1000$$

$$x_1 + x_2 \leq 800$$

$$x_1 \leq 400$$

$$x_2 \leq 700$$

and $x_1, x_2 \geq 0$