Avinashilingam Institute for Home Science and Higher Education for Women
Deemed to be University Estd. u/s 3 of UGC Act 1956, Category A by MHRD (now MoE)
Re-accredited with A++ Grade by NAAC. CGPA 3.65/4, Category I by UGC
Coimbatore - 641 043, Tamil Nadu, India

Continuous Internal Assessment Test I – August 2025
Semester V

Class : III UG **Time: 2Hrs**
Major: Mathematics **Max. Marks: 60**

23BMADE4 – Linear Programming

Course Outcomes:

On completion of the course, the students will be able to

1. analyze and solve linear programming models of real-life situations.
2. provide graphical solutions of linear programming problems with two variables, and illustrate the concept of convex set and extreme points.
3. understand the theory of the simplex method.
4. know about the relationships between the primal and dual problems, and to understand sensitivity analysis.
5. learn about the applications to transportation, assignment and two-person zero-sum game problems.

Part –A **6x1=6**

Answer ALL the questions

1. A set is said to be open set of it contains: CO1K1
   a) All its boundary points
   b) All its extreme points
   c) Only the interior points
   d) All its points
2. The number of extreme points of a convex set are CO1K2
   a) Always finite in number
   b) Always infinite in numbers
   c) May be finite or infinite
   d) None of these
3. The convex null of the set of all the points on the circumference of the circle is the: CO1K2
   a) Whole circle
   b) Circumference of the circle
   c) Interior of the circle
   d) Outer area of the circle

4. Linear Programming problem involving more than two variables can be solved by CO2K1
   a) Simplex method
   b) Graphical method
   c) Matrix Minima method
   d) Hungarian method
5. The coefficient of artificial variable in the objective function of maximization problem is CO2K2
   a) -M b) +M c) 0 d) 1
6. In the simplex method the outgoing / leaving variable is one with ------ value of replacement ratio. CO2K2
   a)Smallest non-negative c) Smallest negative
   b)Largest d) zero

Part-B

Answer ALL the questions 3x6=18

7.a. Solve the following LPP by graphical method

Min $z = 3x + 2y$ subject to

$5x + y \geq 10$; $x + y \geq 6$; $x + 4y \geq 12$; $x \geq 0, y \geq 0$ CO1K2

(or)

7.b. Define a convex set. Show that S is defined as:

$S = \{(x, y) / x^2 + y^2 \leq 4\}$ is a convex set CO1K2

8.a. Find all the basic feasible solutions of the equations: CO1K2

$x_1 + x_2 + 2x_3 + 3x_4 = 12$

$x_2 + 2x_3 + x_4 = 8$ (or)

8.b. Write the Linear Programming Problem in canonical form: Minimize $Z = 3x_1 - 2x_2$ subject to

$-x_1 + x_2 \geq 3$; $3x_1 + x_2 \leq 4$; $x_2 \geq 0$ CO1K2

9.a. Solve the following Linear Programming problem by Simplex Method:

Maximize $z = 2x + 3y + 4z$ subject to

$2x+5y+6z \leq 8$, $3x+6y+4z \leq 6$, $5x+3y+2z \leq 4$, $x \geq 0, y \geq 0, z \geq 0$ CO2K2

(or)

9.b. Solve the following Linear Programming problem by Simplex Method and give your comments:

Maximize $Z = 3x_1 + 2x_2$ subject to $x_1 - x_2 \leq 1$; $x_1 + x_2 \geq 3$; $x_1, x_2 \geq 0$. CO2K2

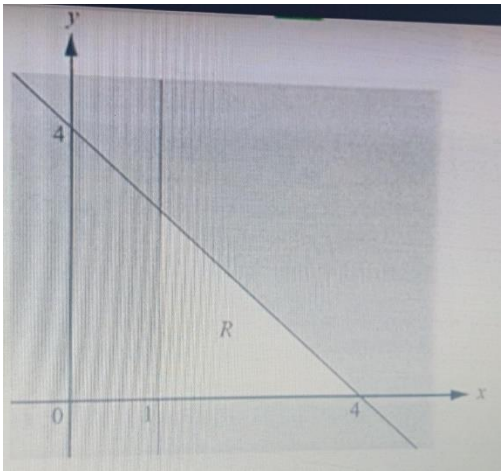
Part-C

Answer ALL the questions **3x12=36**

10.a. Prove that to every BFS of LPP : Min $Z = cX \quad AX = b, x \geq 0$ there corresponds on extreme point of the feasible region. CO1K2

(OR)

10.b. Write 3 inequalities that define the unshaded region R in the diagram below. CO1K4



11.a. A company that operates 10 hours a day manufactures two products on 3 sequential processes. The following table summarizes the data of the problem.

Profit	Minutes per unit			Unit Profit
	Process 1	Process 2	Process 3	
1	10	6	8	$ 20
2	5	20	10	$ 30

Determine the optimal mix of two products. CO1K4

(OR)

11.b. Solve the following Linear Programming problem by Two Phase Method:

Maximize $z = x + 4y + 3z$ subject to

x+y+z=4, -2x+3y-z ≤ 2, y-2z ≤ 1 , $x \geq 0, y \geq 0, z \geq 0$ CO2K3

12.a. Using Simplex method, find the solution of the following LPP:

Min $z = x - 3y$+2z subject to

3x-y+2z ≤ 7 ; 2x-4y ≥ - 12, -4x+3y+8z ≤ 10, $x \geq 0, y \geq 0, z \geq 0$ CO2K4

(OR)

12.b. Solve the following LPP by Big-M method:

Maximize $z = x - 4y$+3z subject to

2x-y+5z=40, x+2y-3z ≥ 22, 3x+y+2z = 30, $x \geq 0, y \geq 0, z \geq 0$. CO2K3

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