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 II – October 2025
Semester V

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

23BMADE4 – Linear Programming

Course Outcomes:

CO1: analyze and solve linear programming models of real-life situations.
CO2: provide graphical solutions of linear programming problems with two variables, and illustrate the concept of convex set and extreme points.
CO3: understand the theory of the simplex method.
CO4: know about the relationships between the primal and dual problems, and to understand sensitivity analysis.
CO5: learn about the applications to transportation, assignment and two-person zero-sum game problems.

Part –A **6x1=6**

Answer ALL the questions

1. What is the fundamental concept behind the duality in Linear Programming? CO3K2
   a. It involves solving two independent linear programming problems.
   b. It establishes a relationship between a primal problem and its related dual problem.
   c. It focuses on converting maximization problems into minimization problems.
   d. It is only applicable to problems with a single constraint.

2. If the kth variable of the primal problem is an equality, then the corresponding dual variable y+k+ is ---------- CO3K1
   a. restricted in sign b. unrestricted in sign
   c. equal to zero d. positive

3. What is the primary purpose of sensitivity analysis? CO4K1
   a. To solve the actual problem
   b. To account for model or input uncertainty and understand variable impact
   c. To bu1ild a decision tree
   d. To optimize cost

4. LPP involving more than two variables can be solved by CO4K1
   a. Simplex method b. Graphical method
   c.Matrix Minima method d. Hungarian method

5. A solution that satisfies all conditions of supply and demand but may or may not be optimal is called ---------- CO5K1
   a. Initial basic feasible solution b. Feasible solution
   c. Basic solution d. Basic feasible solution

6. Row wise and column wise difference between two minimum costs is calculated under ---------method CO5K2
   a. Smallest non-negative b. Largest
   c. Smallest negative d. zero

Part-B **3x6=18**

Answer ALL questions

7.a. Write the dual of the following primal LPP

Min z = 2x + 3y + 4z subject to
2x+3y+5z $\geq$ 2; 3x+y+7z = 3;x+4y+6z $\leq$ 5; x $\geq$ 0, y $\geq$ 0 and z is unrestricted. CO3K2

(OR)

7.b. State the important characteristics of Duality and write the advantages of Duality with its applications. CO3K3

8.a. Consider the LPP Max Z = 5x+3y subject to 3x+5y$\leq$15;5x+6y$\leq$10 and x, y $\geq$0.

(a) Solve the LPP (b) Find how far the component C_1 of C can be increased without affecting the optimality of the solution. CO4K3

(OR)

8.b. What is sensitivity analysis in an LPP? Discuss its significance fully. CO4K2

9.a. Obtain an initial basic feasible region, to the following transportation problem, using North – West Corner rule. CO2K4

	D	E	F	G	Available
A	11	13	17	14	250
B	16	18	14	10	300
C	21	24	13	10	400
Requirement	200	225	275	250	

(OR)

9.b. Obtain an initial basic feasible region, to the following transportation problem, using matrix minima method. CO2K3

	D_1	D_2	D_3	D_4	Capacity
O_1	1	2	3	4	6
O_2	4	3	2	0	8
O_3	0	2	2	1	10
Demand	4	6	8	6	

Part-C **3x6=18**

Answer ALL questions

10.a. Use Dual simplex method to solve the following problem: Max Z = -2x-3y

Subject to x + y $\geq$ 2; 2x+y $\leq$ 10 ; x + y $\leq$ 8 and x $\geq$ 0, y $\geq$ 0. CO3K2

(OR)

10.b. Use Duality to solve the following problem: Min Z = x-y

subject to 2x + y $\geq$ 2; -x-y $\geq$ 1; and x $\geq$ 0, y $\geq$ 0. CO3K2

11.a. Consider the LPP Max Z = 5x+12y+4z

subject to x+2y≤5;5x-y+2z=2 and x, y, z ≥0 CO4K2

(OR)

11.b. Consider the LPP Max Z = 5x+12y+4z subject to x+2y+z≤5;2x-y+3z=2 and x, y, z ≥0.

(a) Discuss the effect of changing a_3 to $\begin{pmatrix}2\\5\end{pmatrix}$ from $\begin{pmatrix}1\\3\end{pmatrix}$

(b) Discuss the effect of changing a_3 to $\begin{pmatrix}-5\\2\end{pmatrix}$ from $\begin{pmatrix}1\\3\end{pmatrix}$. CO4K2

12.a. Find the starting solution in the following transportation by VAM and also obtain the optimum solution. CO2K4

	D_1	D_2	D_3	D_4	Supply
S_1	3	7	6	4	5
S_2	2	4	3	2	2
S_3	4	3	8	5	3
Demand	3	3	2	2	

(OR)

12.b. (i)What is a game in game theory ?

(ii)What are the properties of a game? Explain the "best strategy" on the basis of minimax criterion of optimality. CO4K3

(iii) Determine which of the following two-person zero-sum games are strictly determinable and fair. Give the optimum strategies for each player in the case of strictly determinable games:

a.

Player A		Player B	
		B_1	B_2
	A_1	-5	2
	A_2	-7	-4

.

b.

Player A		Player B	
		B_1	B_2
	A_1	10	6
	A_2	8	2

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