D5BMT2005 (PAGES 3) Reg.No.....

Name:.....

FIFTH SEMESTER B.Sc. DEGREE EXAMINATION, NOVEMBER 2022

(Regular/Improvement/Supplementary)

MATHEMATICS

GMAT5B09T: LINEAR PROGRAMMING

Time: 2 Hours **Maximum Marks: 60**

SECTION A: Answer the following questions. Each carries 2 marks.
(Ceiling 20 Marks)

1. Write the general statement of a canonical maximization LPP.
2. Define a convex set in $\mathbf{R}^n$. Give an example.
3. Write the canonical slack maximization problem represented by the following tableau

x_1	x_2	-1	
-2	-5	-4	$= -t_1$
1	1	7	$= -t_2$
1	-1	4	$= -t_3$
- 36		0	$= f$

4. Pivot on the element 4 for the following tableau.

x_1	x_2	-1	
1	2	3	$= -t_1$
5	4	6	$= -t_2$
6	-1	7	$= f$

5. When we can say that a canonical slack minimization tableau is basic feasible?
6. State duality theorem.
7. Write the matrix form of a canonical maximization LPP.
8. Write the dual of the following maximization LPP.

Maximize $f(x, y, z) = 2x - 3y + 5z$
subject to $x + y + z \leq 5$
$5x - 2y \geq 6$
$2x + 3y - 4z \geq -1$
$x, y, z \geq 0$

9. Explain the term "complementary slackness".

(PTO)

10. Construct the Tucker tableau for the following noncanonical LPP.

Minimize $g(x, y, z) = x + 2y + 3z$

subject to $x + y + z \geq 1$

$2y + z = 1$

$x + z \geq 1$

$x, z \geq 0$

11. Define a basic feasible solution of a balanced transportation problem.
12. Define a cycle in a transportation tableau. Give an example.

SECTION B: Answer the following questions. Each carries 5 marks. (Ceiling 30 Marks)

13. Solve the following LPP by graphical method.

Maximize $f(x, y) = x + y$

subject to $x - y \leq 3$

$2x + y \leq 12$

$0 \leq x \leq 4$

$0 \leq y \leq 6$

14. Solve the following canonical maximization LPP

Maximize $f(x, y, z) = x + y + z$

subject to $2x + y + 2z \leq 2$

$4x + 2y + z \leq 2$

$x, y, z \geq 0$

15. Reduce the following maximum tableau to a maximum basic feasible tableau.

x_1	x_2	-1	
-1	-2	-3	$= -t_1$
1	1	3	$= -t_2$
1	1	2	$= -t_3$
-2	4	0	$= f$

16. Solve the following noncanonical LPP.

Minimize $g(x, y, z) = 3x + y + 2z$

subject to $x + 2y + 3z \geq 24$

$2x + 4y + 3z = 36$

$y, z \geq 0$

17. State and prove duality equation.

18. Apply Vogel's Advanced start method to the following transportation problem.

7	2	4	10
10	5	9	20
7	3	5	30
20	10	30	

19. Solve the following five persons -five jobs assignment problem where P_i's denote persons and J_j's denote jobs.

	J_1	J_2	J_3	J_4	J_5
P_1	8	4	2	6	1
P_2	0	9	5	5	4
P_3	3	8	9	2	6
P_4	4	3	1	0	3
P_5	9	5	8	9	5

SECTION C: Answer any *one* question. Each carries 10 marks.

20. Solve the following minimization linear programming problem.

Minimize $f(x, y, z) = 3x - y + z$

subject to $4x - y \leq 8$

$8x + y + 3z \geq 12$

$5x - 6z \geq 13$

$x, y, z \geq 0$

21. Solve the following balanced transportation problem.

	D_1	D_2	D_3	Supply
O_1	50	30	220	1
O_2	90	45	170	4
O_3	250	200	50	4
Required	4	2	3	9

(1 × 10 =10 Marks)