D 10669 **(Pages : 4)** **Name..**

Reg. No....................................

FIFTH SEMESTER U.G. DEGREE EXAMINATION, NOVEMBER 2021

(CBCSS—UG)

Mathematics

MTS 5B 08—LINEAR PROGRAMMING

(2019 Admissions)

Time : Two Hours Maximum : 60 Marks

Section A

Answer at least **eight** *questions.*
Each question carries 3 marks.
All questions can be attended.
Overall Ceiling 24.

1. Define canonical minimization linear programming problem.

2. Give an example of a bounded polyhedral convex subset in $\mathbb{R}^2$.

3. State the canonical minimization linear programming problem represented by the following tableau :

x	1	2	3
y	4	5	6
-1	7	8	9
	$= t_1$	$= t_2$	g

4. Define unbounded linear programming problem.

5. Pivot on 5 in the canonical maximum tableau given below :

x_1	x_2	-1	
1	2	3	$= -t_1$
4	5	6	$= -t_2$
7	8	9	$= f$

6. Write the simplex algorithm for maximum tableaus.

7. What do you mean by complementary slackness ?

8. State Duality theorem.

Turn over

9. Consider the canonical maximization linear programming problem given below ;

Maximize $f(x_1, x_2) = x_1$ subject to

$$x_1 + x_2 \le 1$$
$$x_1 - x_2 \ge 1$$
$$x_2 - 2x_1 \ge 1$$
$$x_1, x_2 \ge 0$$

state the dual canonical minimization of the linear programming problem.

10. Distinguish between balanced and unbalanced transportation problem.

11. Using VAM to obtain a basic feasible solution of the transportation problem given below :

4	5	5
3	2	7
6	3	9
7	5	4
14	11	

12. Explain the minimum entry method for obtaining initial basic feasible solution in transportation problem.

(8 × 3 = 24 marks)

Section B

Answer at least **five** *questions.*
Each question carries 5 *marks.*
All questions can be attended.
Overall Ceiling 25.

13. Solve the following linear programming problem by geometrical method.

Maximize $f(x, y) = -2y - x$ subject to

$$2x - y \ge -1$$
$$3y - x \le 8$$
$$x, y \ge 0.$$

14. Solve the following canonical linear programming problem using simplex algorithm :

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

15. Solve the canonical linear programming problem using simplex algorithm :

x	-2	1	-3
y	1	-2	-2
-1	1	0	0
	$= t_1$	$= t_2$	g

16. Solve the non-canonical linear programming problem given below

Maximize $f(x,y,z) = 2x + y - 2z$ subject to

$x + y + z \leq 1$
$y + 4z = 2$
$x, y, z \geq 0.$

17. Write the dual simplex algorithm for minimum tableaus.

18. Solve the transportation problem given below :

	M_1	M_2	M_3	
W_1	2	1	2	50
W_2	9	4	7	70
W_3	1	2	9	20
	40	50	20	

19. Apply Northwest-corner method to obtain the initial basic feasible solution of the transportation problem given below :

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

(5 × 5 = 25 marks)

Section C

Answer any **one** *question.*
The question carries 11 *marks.*

20. Solve the canonical linear programming problem given below using the simplex algorithm.

x	y	z	-1	
1	2	1	4	$= -t_1$
2	1	5	5	$= -t_2$
3	2	0	6	$= -t_3$
1	2	3	0	$= f$

Turn over

21. Write the Hungarian algorithm. Using this algorithm solve the following assignment problem :

2	3	2	4
5	8	4	3
5	9	5	2
7	6	7	4

(1 × 11 = 11 marks)