

D 10669

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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

$= t_1 \quad = t_2 \quad g$

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 tableaux.
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

$$x_1 + x_2 \leq 1$$

$$x_1 - x_2 \geq 1$$

$$x_2 - 2x_1 \geq 1$$

$$x_1, x_2 \geq 0$$

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

$$2x - y \geq -1$$

$$3y - x \leq 8$$

$$x, y \geq 0.$$

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

$= t_1 \quad = t_2 \quad g$

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)