23U504 (Pages: 3) Name: .....

Reg. No: .....

FIFTH SEMESTER B.Sc. DEGREE EXAMINATION, NOVEMBER 2025

(CBCSS - UG)

(Regular/supplementary/Improvement)

CC20UMTS5B08 - LINEAR PROGRAMMING

(Mathematics - Core Course)

(2020 Admission onwards)

Time: 2:00 Hours Maximum : 60 Marks

Credits : 3

Part B

Answer ***all*** questions. Each question carries 3 marks.

1. Write the canonical form of the Linear programming problem
   Maximise $f(x, y) = -2y - x$. Subject to

$$\begin{aligned} 2x - y &\geq -1 \\ 3y - x &\leq 8 \\ x, y &\geq 0 \end{aligned}$$

2. Draw and shade the feasible region of the linear programming problem
   Maximise $f(x, y) = 30x + 40y$. Subject to

$$\begin{aligned} 2x + y &\leq 8 \\ x + 2y &\leq 10 \\ x &\geq 0 \end{aligned}$$

3. Give example of a bounded nonconvex subset of $\mathbb{R}^2$.
4. True or false: Any LPP having unbounded constraint set is unbounded. Justify.
5. Write a necessary and sufficient condition for the simplex tableau to be minimum basic feasible.
6. State the simplex algorithm anticycing rules.
7. Give example of a Non canonical maximisation linear programming problem.
8. State the dual canonical linear programming problem of
   Maximise : $g(y_1, y_2) = -y_2$. Subject to

$$\begin{aligned} y_- y_2 &\geq 1 \\ -y_1 + y_2 &\geq 2 \\ y_1, y_2 &\geq 0 \end{aligned}$$

9. Show that for any pair of feasible solutions of dual canonical LPP $g \geq f$.
10. Define Pure and mixed strategies of a row and column player in matrix game.

11. Check whether the given transportation problem is balanced. if not balance the problem.

	M_1	M_2	M_3	
W_1	2	1	2	40
W_2	9	4	7	60
W_3	1	2	9	10
	50	60	30	

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12. Describe the Northwest Corner rule

(Ceiling: 20 Marks)

Part B

Answer ***all*** questions. Each question carries 5 marks.

13. 'Solve the following maximisation LPP graphically
Maximise: $f(x, y) = -2y - x$. Subject to

$$\begin{aligned} 2x - y &\geq -1 \\ 3y - x &\leq 8 \\ x, y &\geq 0 \end{aligned}$$

14. Find all optimal solutions of the following problem using simplex method.
Maximise : $f(x, y) = x + y$. Subject to

$$\begin{aligned} x + y &\leq 2 \\ x - y &\leq -1 \\ x, y &\geq 0 \end{aligned}$$

15. Solve the non- canonical LPP.
Maximise : $f(x, y) = x + 3y$. Subject to

$$\begin{aligned} x + 2y &\leq 10 \\ 3x + y &\geq 15 \end{aligned}$$

16. State and Prove Duality Equation.
17. Explain Dual simplex algorithm for Minimum Tableaus
18. Solve the transportation problem using Minimum-Entry Method

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

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19. Solve the assignment problem using transportation algorithm

2	1	2
9	4	7
1	2	9

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(Ceiling: 30 Marks)

Part C

Answer any ***one*** questions. The question carries 10 marks

20. Solve the linear programming problem given below using simplex method.

Maximise : $f(x, y) = 4y - 2x$. Subject to

$$\begin{aligned} x + 2y &\leq 3 \\ x + y &\leq 3 \\ x + y &\leq 2 \\ x, y &\geq 0 \end{aligned}$$

21. State Von-Neumann Minimax Theorem. Also find the Von-Neumann value and optimal strategy for each player in the matrix game

$$\begin{matrix} 2 & 1 & 4 & 2 \\ 1 & 2 & 1 & 1 \\ -2 & 6 & 3 & -2 \\ 3 & -3 & 5 & 1 \\ 1 & 2 & 2 & 1 \end{matrix}$$

(1 × 10 = 10 Marks)

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