22U508 (Pages: 3) Name: ……………………

Reg. No: …………………

FIFTH SEMESTER B.Sc. DEGREE EXAMINATION, NOVEMBER 2024

(CBCSS - UG)

(Regular/supplementary/Improvement)

CC20U MTS5 B08 - LINEAR PROGRAMMING

(Mathematics - Core Course)

(2020 Admission onwards)

Time: 2.00 Hours

Maximum : 60 Marks

Credits : 3

Part A

Answer ***all*** questions. Each question carries 2 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. State the Canonical minimisation linear programming problem represented by the tableau.

x	2	-2	-1
y	-1	1	-1
-1	2	1	0
	$=s_1$	$=s_2$	$=g$

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. State Von-Neumann Minimax Theorem.

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	

12. Find a permutation set of zeros in

1	0	0
0	1	0
1	0	1

(Ceiling: 20 Marks)

Part B

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

13. Solve by graphical method
Maximise: $f(x, y) = 5x + 2y$. Subject to

$$\begin{aligned} x + 3y &\leq 14 \\ 2x + y &\leq 8 \\ x, y &\geq 0 \end{aligned}$$

14. Solve using simplex method
Maximise : $f(x, y) = 2x - 4y$. Subject to

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

15. Solve the non canonical linear programming problem.
Maximise: $f(x, y, z) = x + 2y + z$. Subject to

$$\begin{aligned} x + y + z &= 6 \\ x + y &\leq 1 \\ x, z &\geq 0 \end{aligned}$$

16. State and Prove Duality Equation.

17. Explain Dual simplex algorithm for Minimum Tableaus

18. Solve the transportation problem

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

19. Solve the assignment problem

31	28	34
41	14	36
28	20	25

(Ceiling: 30 Marks)

Part C

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

20. Solve the canonical linear programming problem given below using simplex method.
Maximise : $f(x, y, z, w) = x + 2y + 2z - 4w$. Subject to

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

21. Solve the given assignment problem using a)transportation algorithm b)Hungarian algorithm. And compare the solution.

2	1	2
9	4	7
1	2	9

(1 × 10 = 10 Marks)

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