20U504 (Pages: 3) Name: ……..………..……..

Reg. No: ………………….

FIFTH SEMESTER B.Sc. DEGREE EXAMINATION, NOVEMBER 2022

(CBCSS-UG)

CC20U MTS5 B08 - LINEAR PROGRAMMING

(Mathematics – Core Course)

(2020 Admission - Regular)

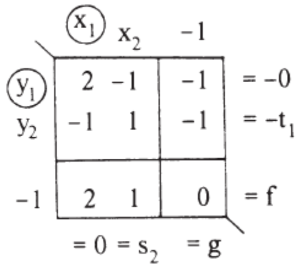
Time: 2 Hours Maximum: 60 Marks

Credit: 3

Part A

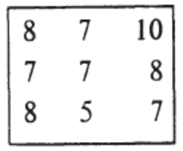
Answer ***all*** questions. Each question carries 2 marks.

1. Define polyhedral convex set. Give one example.
2. Any unbounded linear programming problem has an unbounded constraint set. True or False? Justify.
3. Draw and shade a convex subset that has infinite extreme point in plane.
4. What is the condition for optimality in the simplex algorithm?
5. What is relevance of anticycling rule in a simplex algorithm?
6. Distinguish between canonical and non-canonical linear programming problem.
7. Write down minimization problem from the dual table



	x_1	x_2	-1	
y_1	2	-1	-1	$= -0$
y_2	-1	1	-1	$= -t_1$
-1	2	1	0	$= f$
	$= 0$	$= s_2$	$= g$	

8. Define the terms pure strategy and mixed strategy.
9. Write down the general balanced transportation problem.
10. Define basic feasible solution of a transportation problem.
11. Method for solving transportation problem is not used for solving assignment problem. Why?
12. Solve the assignment problem.



8	7	10
7	7	8
8	5	7

(Ceiling: 20 Marks)

Turn Over

Part B

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

13. Solve the linear programming problem using geometric method.

$$\begin{array}{ll} \text{Maximize} & f(x, y, z) = 2x + y - 2z \\ \text{subject to} & x + y + z \leqq 1 \\ & y + 4z \leqq 2 \\ & x, y, z \geqq 0. \end{array}$$

14. Solve using simplex algorithm.

$$\begin{array}{ll} \text{Minimize} & g(x, y) = y - 5x \\ \text{subject to} & x - y \geqq 1 \\ & y \leqq 8 \\ & x, y \geqq 0 \end{array}$$

15. Solve.

$$\begin{array}{cc|c|l} \textcircled{x} & \textcircled{y} & -1 & \\ \hline 1 & 2 & 10 & = -t_1 \\ -3 & -1 & -15 & = -t_2 \\ \hline 1 & 3 & 0 & = f \\ \hline \end{array}$$

16. State and prove duality theorem.

17. Reduce the payoff matrix using domination method.

$$\begin{array}{cc} & \text{II} \\ \text{I} & \begin{bmatrix} 1 & -3 & 1 & 0 & 1 \\ -3 & -2 & -1 & 0 & 1 \\ 1 & -1 & 1 & 1 & -1 \\ -2 & -1 & 0 & 1 & 2 \\ 1 & -1 & -1 & -1 & 1 \end{bmatrix} \end{array}$$

18. Find initial basic feasible solution using north west corner method.

5	9	10	6	4
10	7	5	4	5
4	5	5	4	2
6	5	7	5	3
3	4	4	3	

19. Write down the Hungarian algorithm for finding optimal solution for an assignment problem.

(Ceiling: 30 Marks)

Part C

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

20. Find optimal solution for the minimization and minimization problem in the dual table.

$$\begin{array}{c|ccc|c|l} & \textcircled{x_1} & \textcircled{x_2} & x_3 & -1 & \\ \hline \textcircled{y_1} & 1 & -1 & 2 & 1 & = -0 \\ y_2 & 2 & 0 & 2 & -1 & = -t_1 \\ y_3 & 0 & 1 & -1 & -1 & = -t_2 \\ \hline -1 & 1 & -1 & 3 & 0 & = f \\ \hline & = 0 & = 0 & = s_1 & = g & \end{array}$$

21. Find IBFS using VAM method. Hence find the optimum solution for the transportation problem.

6	5	4	10
3	7	2	16
5	10	8	10
4	6	3	12
10	7	6	

(1 × 10 = 10 Marks)

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