19U504 (Pages: 3) Name: ……..…….……..

Reg. No: …….

FIFTH SEMESTER B.Sc. DEGREE EXAMINATION, NOVEMBER 2021

(CBCSS-UG)

CC19U MTS5 B08 - LINEAR PROGRAMMING

(Mathematics – Core Course)

(2019 Admission - Regular)

Time: 2 Hours Maximum: 60 Marks

Credit: 3

Part A

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

1. Define a canonical minimization linear programming problem.
2. Any linear programming problem having an unbounded constraint set is unbounded. True or False? Justify.
3. Draw and shade a convex subset that has no extreme point in plane.
4. Write down the tucker table for the linear programming problem.

   Minimize $g(x, y) = 2x - y$

   Subject to $x - 2y \leq 1$,

   $2x + y \geq 2$,

   $x, y \geq 0$
5. What is the condition for which simplex algorithm for maximum feasible table gives an unbounded solution?
6. What is cycling in a simplex algorithm?
7. Is it possible to have a slack variable of 0? Explain
8. State Duality equation.
9. What is meant by balanced transportation problem?
10. Suppose in a 3×3 transportation table the allocations are given on the cells $x_{11}, x_{13}, x_{22}, x_{31}, x_{33}$. Whether it will form a basis?
11. Assignment problem is a special type of transportation problem. Justify.
12. Solve the assignment problem

2	1	2
9	4	7
1	2	9

(Ceiling 20 Marks)

Part B

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

13. Vitamins B1 and B2 are found in two foods F1 and F2. 1 unit of F1 contains 3 units of B1 and 4 units of B2. 1 unit of F2 contains 5 units of B1 and 3 units of B2 respectively. Minimum daily prescribed consumption of B1 & B2 are 50 and 60 units respectively. Cost per unit of F1 & F2 are Rs. 6 & Rs. 3 respectively. Formulate it as an LPP. Also find amount of F1 and F2 have to be consumed with minimum cost.

14. Solve the linear programming problem using geometric method.

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

Subject to $x + y + z \leq 1$,

$y + 4z \leq 2$,

$x, y, z \geq 0$.

15. Solve using simplex algorithm

x_1	x_2	-1	
2	1	8	$= -t_1$
1	2	10	$= -t_2$
30	50	0	$= f$

16. Solve the non-canonical linear programming problem using simplex method for maximum tableau

Maximize $f(x, y) = x + 3y$

subject to $x + 2y \leqq 10$

$3x + y \leqq 15$.

17. State primal and dual linear programming problem from the given tucker table

	(x1)	(x2)	x3	−1	
(y1)	1	−1	2	1	= −0
y2	2	0	2	−1	= −t1
y3	0	1	−1	−1	= −t2
−1		−1	3	0	= f
	= 0	= 0	= s1	= g	

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

	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	

19. Solve the assignment problem

4	6	5	10
10	9	7	13
7	11	8	13
12	13	12	17

(Ceiling 30 Marks)

Part C

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

20. Solve using simplex method. Check whether infinite solution exist or not?

x	y	z	w	−1	
0	1	1	−1	3	$= -t_1$
1	1	1	−1	3	$= -t_2$
1	2	2	−4	0	$= f$

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

8	2	3	7	42
9	4	5	6	17
7	1	6	5	17
9	14	24	29	

(1 × 10 = 10 Marks)

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