Q.P Code D134144	Total Pages 3	Name 672292
		Register No.

THIRD SEMESTER UG DEGREE EXAMINATION, NOVEMBER 2025

(CUFYUGP)

MAT3MN205

Optimization Techniques

2024 Admission Onwards

Maximum Time :2 Hours	**Maximum Marks :70**

Section A

All Question can be answered. Each Question carries 3 marks (Ceiling: 24 Marks)

1	Write the General Linear Programming Problem
2	Which are the characteristics of Graphical method?
3	Define Surplus variable in Linear Programming. Give an Example
4	Write the following linear programming problem in Simplex format **Maximize Z=3a+2b+4c** Subject to $3a + 4b - 5c \leq 3, \quad a - 2b - c \leq 1, \quad 2a + b \geq 2, \quad a, b, c \geq 0$
5	Explain the situation when Big-M method used in Linaer Programming Problems.
6	How can we solve Degeneracy in Linear Programming Problems
7	Why is the transportation model considered a special type of linear programming problem?
8	Write different methods to get Basic feasible solution and also for optimality test in transportation model.
9	Explain loaded cells and empty cells in transportation matrix
10	Write the difference in allocation between North – west corner method and least cost cell method

Section B

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All Question can be answered. Each Question carries 6 marks (Ceiling: 36 Marks)

11 Draw the feasible area of the following constraints.

$$x + 2y \leq 3, \quad 2x - y \leq 0, \quad 3x + 4y \leq 12 \quad x, y \geq 0$$

12 Using graphical method,

Maximize $2x + y$

subject to

$$x - 2y \geq 2, \quad 2x + 4y \leq 8 \quad x, y \geq 0$$

13 Solve by Simplex Method

Maximize Z=3a+2b Subject to

$$a - 3b \leq 6, \quad a + 5b \leq 10, \quad a, b \geq 0$$

14 Solve the LPP by Big-M Method

Maximize x + 5y subject to.

$$x + y \leq 3, \quad y \geq 8, \quad x, y \geq 0$$

15 A company manufactures two product A and B. These are machined on machines X and Y. A takes one hour on machine X and one hour on Machine Y. Similarly product B takes 4 hours on Machine X and 2 hours on Machine Y. Machine X and Y have 8 hours and 4 hours as idle capacity. The planning manager wants to avail the idle time to manufacture A and B. The profit contribution of A is Rs. 3/– per unit and that of B is Rs.9/– per unit. Find the optimal product mix.

16 Solve the following transportation model

	D_1	D_2	D_3	Supply
S_1	8	6	10	20
S_2	9	7	4	30
Demand	10	25	15	50

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17 Three factories F_1, F_2, F_3 supply four warehouses $W_1, \ldots, W_4$. Supply, demand and unit transportation costs (in Rs.) are:

Factory	W_1	W_2	W_3	W_4	Supply
F_1	4	6	8	5	8
F_2	7	3	4	2	9
F_3	5	9	1	6	7
Demand	5	8	6	5	

Find the Optimal Solution for least cost transportation cost.

18 Solve the following by Vogel's Approximation Method

	W_1	W_2	W_3	Supply
F_1	4	1	3	8
F_2	2	5	9	7
F_3	3	6	1	5
Demand	6	7	7	

Section C

Answer any ONE. Each Question carries 10 marks (1x10=10 Marks)

19 Using graphical method,

Minimize $3x - 5y$

subject to

$$x + 2y \geq 6, \quad 5x + 3y \leq 15 \quad , x \leq 3x, y \geq 0$$

20 There are 5 machines $M_1, \ldots, M_5$ and 5 jobs $J_1, \ldots, J_5$. The *returns* (benefit) matrix B (rows = machines, columns = jobs) is:

$$B = \begin{array}{c|ccccc} & J_1 & J_2 & J_3 & J_4 & J_5 \\ \hline M_1 & 9 & 7 & 6 & 8 & 5 \\ M_2 & 6 & 10 & 8 & 7 & 9 \\ M_3 & 7 & 6 & 11 & 5 & 8 \\ M_4 & 8 & 9 & 5 & 10 & 6 \\ M_5 & 5 & 8 & 7 & 6 & 11 \end{array}$$

Assign the jobs to machines so as to **maximize** the total return.