Q.P Code D134500	Total Pages 3	Name 672369
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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 steps for formulating a linear programming problem
2	Write different methods for the solution of a linear programming problem
3	Draw the feasible area of the following constraints. $$x - 2y \leq 4, \quad 2x - 3y \leq 6, \quad y \leq 4 \quad x, y \geq 0$$
4	Define Slack variable in Linear Programming. Give an Example
5	Write the following linear programming problem in Simplex format **Maximize Z=a-2b+5c** Subject to $$a + 7b + 2c \leq 3, \quad a + 2b - 5c \geq 1, \quad a - b + 3c \geq 4, \quad a, b, c \geq 0$$
6	Explain Tie and Degeneracy in Linear Programming Problems.
7	Write the difference between Transportation Model and General Linear Programming Model.
8	Formulate the Phase-I simplex version of the Two-Phase Simplex Method for the following linear programming problem. Maximize $Z = 2a–2b–4c$ subject to $$2a + 3b + 5c \geq 2, \quad 3a + b + 7c \leq 3, \quad a + 4b + 6c \leq 5, \quad a, b \geq 0$$

9	Define Opportunity cost in Vogel's Approximation Method. How can it be calculated.
10	Write the difference in allocation between least cost cell method and Vogel's Approximation Method

Section B

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

11 Solve graphically **Maximize Z = 8000a + 7000b** Subject to

$$3a + b \leq 66, \quad a + b \leq 45, \quad a \leq 20, \quad b \leq 40,, \quad a, b \geq 0$$

.

12 Minimise $Z = 1.5x + 2.5y$ subject to

$$x + 3y \geq 3, \quad x + 6y \geq 2, \quad \text{and both } x \text{ and } y \geq 0$$

13 Write the Differences between maximisation case and minimisation case in linear programming problem.

14 Solve by Simplex Method

Maximize Z=a-2b Subject to

$$a + 3b \leq 3, \quad 2a + 8b \leq 8, \quad a, b \geq 0$$

15 Using Two Phase Simplex Method Solve

Maximize $Z = 5x_1 + 4x_2$ subject to

$$x_1 + 2x_2 \geq 8, \quad 3x_1 + 2x_2 = 12, \quad x_1,\ x_2 \geq 0.$$

16 Solve the following Transportation Problem

	D_1	D_2	D_3	D_4	Supply
S_1	2	3	1	4	20
S_2	5	4	8	2	30
S_3	3	6	2	7	25
Demand	10	20	30	15	75

17 Four factories F_1, F_2, F_3, F_4 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	3	1	7	4	7
F_2	2	6	5	9	9
F_3	8	3	4	2	5
F_4	5	7	6	3	8
Demand	6	8	7	8	

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	2	3	1	7
F_2	5	4	8	9
Demand	5	6	5	

Section C

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

19 Solve the LPP by Big-M Method

Maximize 4x + 3y subject to.

$$x + y \leq 50, \quad x + 2y \geq 80, \quad 3x + 2y \geq 140, \quad x, y \geq 0$$

20 There are 4 machines $M_1, \ldots, M_4$ and 4 jobs $J_1, \ldots, J_4$. The *returns* (benefit) matrix B (rows = machines, columns = jobs) is:

$B =$

	J_1	J_2	J_3	J_4
M_1	12	9	7	8
M_2	8	11	10	6
M_3	9	7	12	11
M_4	6	10	8	9

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