

Roll Number : .....

Branch : .....

Group : .....

TIET Patiala  
School of Mathematics

B.Tech . Auxiliary

Optimization Techniques (UMA035/UMA031)

17<sup>th</sup> March , 2022

Time: 2 Hrs; M. Marks: 50

Note: Attempt any five questions. All questions carry Ten marks.

1. Solve the following LPP using Two-Phase method:

$$\min z = 4x_1 + 6x_2 + 5x_3, \text{ s.t. } 2x_1 + 4x_2 + 3x_3 \geq 3, x_1 + 2x_2 + 4x_3 \geq 28, x_1, x_2, x_3 \geq 0.$$

2. Apply Gomory's cutting plane method to find optimal solution of

$$\max z = 7x_1 + 9x_2 \text{ s.t. } -x_1 + 3x_2 \leq 6, 7x_1 + x_2 \leq 35, x_1, x_2 \geq 0 \text{ and are integers.}$$

3. Solve the following transportation problem to maximize the profit and given criteria for optimality:

	1	2	3	4	Capacity
I	40	25	22	33	200
II	44	35	30	30	60
III	38	38	28	30	140
Requirement	80	60	120	40	

Taking Basic feasible solution by VAM.

4. Solve the following assignments for minimization:

Persons ↓ Jobs →	A	B	C	D	E
I	3	6	2	6	5
II	7	1	4	4	7
III	3	8	5	8	3
IV	6	4	3	7	4
V	5	2	4	3	2
VI	5	7	6	2	5

5. Solve the following nonlinear programming problem by Lagrange multiplier method:

$$\max f(X) = 4x_1^2 + 2x_2^2 + x_3^2 - 4x_1x_2, \text{ s.t. } x_1 + x_2 + x_3 = 15, 2x_1 - x_2 + 2x_3 = 20, x_1, x_2, x_3 \geq 0.$$

6. Solve the following LPP by dual Simplex method

$$\max z = -4x_1 - 6x_2 - 8x_3, \text{ s.t. } x_1 + 3x_3 \leq 3, x_2 + 2x_3 \geq 5, x_1, x_2, x_3 \geq 0.$$

P.T.O

7. The following table gives data on normal time-cost and crash time-cost for a project:

Activity	Normal time(Days)	Normal Cost (Rs)	Crash Time (Days)	Crash cost (Rs)
1-2	6	600	4	1000
1-3	4	600	2	2000
2-4	5	500	3	1500
2-5	3	450	1	650
3-4	6	900	4	2000
4-6	8	800	4	3000
5-6	4	400	2	1000
6-7	3	450	2	800

- (i) Draw the network and identify the critical path.
- (ii) What is the normal project duration and associated cost?
- (iii) Find by FF limit method the minimum cost schedule, if the project is to be completed in 21 Days.