

Roll Number :

Branch :

Group :

TIET Patiala
School of Mathematics

B.Tech . EST

4th Jan , 2022

Optimization Techniques (UMA035)

Time:2 Hrs; M. Marks: 35

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

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

$$\text{Max } z = x_1 + 4x_2 \text{ s.t. } 2x_1 + 4x_2 \leq 7, 5x_1 + 3x_2 \leq 15, x_1, x_2 \geq 0 \text{ and are integers.}$$

2. A company has three factories I, II, III and four warehouses 1,2,3 and 4. The transportation cost (in Rs.) per unit from each factory to each warehouse, the requirements of each warehouse, and the capacity of each factory are given below:

	1	2	3	4	Capacity
I	25	17	25	14	300
II	15	10	18	24	500
III	6	20	8	13	600
Requirement	300	300	500	500	

Take basic variables

$x_{14} = 300, x_{21} = 100, x_{22} = 300, x_{24} = 100, x_{33} = 500, x_{34} = 100$ & $x_{41} = 200$, and find optimal cost of transportation.

3. Solve the following assignments for minimization:

Persons ↓ Jobs →	I	II	III	IV	V
A	11	10	18	5	9
B	14	13	12	19	6
C	5	3	4	2	4
D	15	18	17	9	12
E	10	11	19	6	14

4. 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.

P.T.O

5. By using Steepest Descent method, minimize the function

$$f(x_1, x_2) = x_1^2 - x_1x_2 + x_2^2$$

so that the error does not exceed by 0.05. The initial approximation is to be taken as $(1, \frac{1}{2})^T$.

6. Use Kuhn-Tucker conditions to solve

$$\text{Max } z = -x_1^2 - x_2^2 - x_3^2 + 4x_1 + 6x_2, \text{ s.t. } x_1 + x_2 \leq 2, 2x_1 + 3x_2 \leq 12, x_1, x_2 \geq 0.$$

7. Find the stationary points and classify

$$f(X) = 2 + 2x_1 + 3x_2 - x_1^2 - x_2^2.$$

F101 :- 030560, 030575, ~~509~~ 591, 019509, 524, 019468, 499, 019601
019633, 019721, 034850 - 034869

F102 :- 034870 - 034929

F103 :- 034930 - 034977

F104 :- 034978 - 035000, 048201 - 048219

F105 - 048220 - 048261

F106 - 048262 - 048303

F107 - 048304 - 048343

F108 - 048344 - 048403