

Code No: 136FR
JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
B. Tech III Year II Semester Examinations, November/December - 2020
OPTIMIZATION TECHNIQUES
(Common to CE, ME)
Time: 2 hours
Max. Marks: 75

Answer any five questions
All questions carry equal marks

- - -

1. What is objective function? Explain the objective function surfaces in detail. [15]

2. Consider the following problem

Minimize $f(X) = x_1^2 + x_2^2 + x_3^2$

Subject to $x_1 + x_2 + x_3 \geq 5$

$2 - x_2 x_3 \leq 0$

$x_1 \geq 0, x_2 \geq 0, x_3 \geq 2$

Determine whether the Kuhn-Tucker conditions are satisfied at the following points.

[15]

$$X_1 = \begin{pmatrix} 3 \\ 2 \\ 3 \\ 2 \\ 2 \end{pmatrix}$$

$$X_2 = \begin{pmatrix} 4 \\ 3 \\ 2 \\ 3 \\ 3 \end{pmatrix}$$

$$X_3 = \begin{pmatrix} 2 \\ 1 \\ 1 \\ 2 \\ 2 \end{pmatrix}$$

3. Minimize $f = 20x_1 + 16x_2$

[15]

Subject to

$x_1 \geq 2.5$

$x_2 \geq 6$

$2x_1 + x_2 \geq 17$

$x_1 + x_2 \geq 12$

$x_1 \geq 0, x_2 \geq 0$

4. Find initial basis feasible solution for the following transportation problem.

[15]

					Availability
	19	30	50	10	7
	70	30	40	60	9
	40	8	70	20	18
Requirement	5	8	7	14	

5. Consider two non linear equations $2xy=3, x_2 - y=2$. Formulate the problem an unconstrained optimization problem and complete one dimensional minimization steps using the univariate method starting from the origin. [15]

6. Show that function $f(x)=x_2; 0 \leq x \leq 1, f(x)=2-x; 0 \leq x \leq 1$, is unimodel in (0,2). Use the Fibonacci method to find its maximal point within an interval of uncertainty 0.1. [15]

7. Determine whether the following optimization problem convex or not

[15]

Minimize $f = -4x_1 + x_1^2 - 2x_1x_2 + x_2^2$

Subject to $2x_1 + x_2 \leq 6 \quad x_1 - 4x_2 \leq 0 \quad x_i \geq 0 \quad i = 1, 2$

8. Explain computational procedure in dynamic programming.

[15]