

III B.Tech I Semester Supplementary Examinations, May 2005
OPTIMIZATION TECHNIQUES
(Electrical & Electronic Engineering)

Time: 3 hours

Max Marks: 80

Answer any FIVE Questions
 All Questions carry equal marks

1. (a) Explain a single variable optimization technique.
 (b) Find the maxima and minima of

$$f(x) = \frac{x^4}{(x-1)(x-3)^3}$$
2. (a) State and explain the necessary and sufficient conditions for existence of relative optima in case of multivariable optimization with constraints.
 (b) Find the dimensions of a rectangular parallelepiped with largest volume whose sides are parallel to the coordinate planes, to be inscribed in the ellipsoid.
3. (a) In graphical method, when do you get
 - i. infinite number of solutions
 - ii. No solutions.
 (b) Solve the following LPP by graphical method

$$\text{Min } Z = 5x_1 - 2x_2$$

$$\text{Subject to } 2x_1 + 3x_2 \geq 1 \text{ and } x_1, x_2 \geq 0$$
4. Find all the alternate optimal basic solutions of the following problems and then write the general expressions for all the non basic optimal solution.

$$\text{Maximize } Z = x_1 + 2x_2 + 3x_3$$

$$\text{subject to } x_1 + 2x_2 + 3x_3 \leq 10$$

$$x_1 + x_2 \leq 5$$

$$x_1 \leq 1$$

$$x_i \geq 0$$
5. (a) Explain with an example the various methods of finding BFS in transportation problem
 (b) Solve the following transportation problem

			Availability
4	5	7	25
7	7	3	20
7	3	5	40

Requirement 20 25 20
6. Show that the function $f(x)=x_2$, $0 \leq x \leq 1$, $f(x)=2-x$, $0 \leq x \leq 1$, is unimodal in (0,2). Use the Fibonacci method to find its maximal point with in an interval of uncertainty 0.1.

7. (a) Explain the convex programming problem.
(b) By using an interior penalty function method solve the following problem.

$$\begin{array}{ll}\text{Minimize} & f(x_1, x_2) = \frac{1}{3}(x_1 + 1)^3 + x_2 \\ \text{Subject to} & g_1(x_1, x_2) = 1 - x_1 \leq 0 \\ & g_2(x_1, x_2) = -x_2 \leq 0\end{array}$$

8. Minimize $Z = u_1^2 + u_2^2 + u_3^2$,
Subject to $u_1 + u_2 + u_3 = 10$ and $u_1, u_2, u_3 \geq 0$
