2005 JAWAHARLAL NEHRU TECHNOLOGY UNIVERSITY

II B.TECH I SEMESTER SUPPLYMENTARY EXAMINATIONS

OPTIMIZATION TECHNIQUES

(ELECTRICAL AND ELECTRONICS ENGINEERING)

MAY 2005

TIME: 3 HOUR
MARK: 80

ANSWER ANY FIVE QUESTIONS ALL QUESTIONS CARRY EQUAL MARKS

MARK [5*16=80]

1. (a) Explain the theory of multivariable optimization without constraints.

(b) What is objective function? Explain the objective function surfaces.

2. (a) Explain single variable optimization with illustrative example.

(b) Find the extreme points of the function.
$f(x_1, x_2) = x^3$
$1 + x^3$
$2 + 2x^2$
$1 + 2x^2$
$2 + 6.$

3. Solve the following system of equations by using pivot operations.
$4x_1+3x_2+x_3= 13$
$3x_1+7x_3= 24$
$x_1+2x_2+3x_3= 14$

4. (a) Give a generalized mathematical model of Linear Programming Problem.

(b) Explain about the Basic Feasible Solution.

(c) Explain the significance of 'key row', 'key column' and 'key number' and 're-placement ratio' with respect to a Simplex Method.

5. Maximize the following problem using Simplex Method.
$Z = 10x + y + 2z$ Subject to $x+y-2z \# 10$; $4x+y+z \# 20$ and x, y and z 0

6. An oil company has three refinery stations and five filling stations. Transportation cost (rupees for barrel) for shipping oil from refinery station to filling station is shown in the following table.
Filling Station Capacities
F1F2F3F4F5 (barrels)
Refinery R1 360 180 270 180 540 24
Station R2 450 360 450 180 90 36
R3 540 450 360 630 270 42
Requirementes 12 12 18 24 24

7. Solve the following problem using dynamic programming technique: Maximized z = 28x + 7y Subject to: $4x + 3y \# 12$; $2x_1+5x_2 \# 10$; $x_1, x_2 \# 0$.

8. Write short notes on the following:

(a) Kuhn-Rucker conditions

(b) Limitations of Dynamic Programming Technique

(c) Simplex algorithm.