Code No: K0224 **R07** **Set No. 1**

IV B.Tech. II Semester Supplementary Examinations, July/August 2012
OPTIMIZATION TECHNIQUES
(Electrical and Electronics Engineering)

Time: 3 Hours **Max Marks: 80**

Answer any FIVE Questions
All Questions carry equal marks
****

1. Explain the following:
   a) Feasible region
   b) Convex set
   c) Optimal solution and
   d) Sensitivity analysis

2. a) Min $z = x^2 + y^2$
   $2x+3y \geq 10$
   $3x+5y \leq 15$
   $x, y \geq 0$
   b) What are the drawbacks of classical optimization techniques?

3. Solve the following LPP by Simplex method:
   Minimize $z = 3x + 2y$
   Subject to $x \geq 4$
   $x+3y \leq 15$
   $2x+y \leq 10$
   and $x, y \geq 0$

4. a) Write the LP formulation of a transportation problem.
   b) Why is Simplex method not used to solve the transportation problems?

Code No: K0224 **R07** **Set No. 1**

5. Minimize the function $f(x)=x^2+(54/x)$ in the interval [0,5] by the Fibonacci search method. Choose the desired number of function evaluations as 3.

6. Minimize $f(x, y) = x-y+2x^2+2xy+y^2$ with the starting point (0,0) using the Univariate method.

7. Explain Kuhn-Tucker conditions and their significance in constrained optimization problems.

8. Determine the value of u_1, u_2, u_3 so as to Maximize $Z = u_1u_2u_3$ subject to the constraints: $u_1+u_2+u_3 =10$ and $u_1, u_2, u_3 \geq 0$ using dynamic programming

Code No: K0224 **R07** **Set No. 2**

IV B.Tech. II Semester Supplementary Examinations, July/August 2012

OPTIMIZATION TECHNIQUES

(Electrical and Electronics Engineering)

Time: 3 Hours **Max Marks: 80**

Answer any FIVE Questions
All Questions carry equal marks
****

1. Discuss the typical applications of optimization techniques in electrical and electronics engineering.

2. Minimize $f(x, y) = 3x+4y+2x^2+2xy+y^2$
   Subject to $2x+ 3y\leq6$
   $4x+3y\geq12$
   $x , y \geq0$

3. a) What are the assumptions involved in Simplex method? Explain.
   b) What is Duality? Explain its significance.

4. A company has three production facilities S_1, S_2, S_3 with production capacity of 7,9 and 18 units (in 100s) per week of a product, respectively. These units are to be shipped to four warehouses D_1, D_2, D_3, D_4 with the requirement of 5, 6, 7 and 14 units (in 100s) per week, respectively. The transportation costs (in rupees) per unit between factories to warehouses are given in the table below:

	D_1	D_2	D_3	D_4	capacity
S_1	19	30	50	10	7
S_2	70	30	40	60	9
S_3	40	8	70	20	18
Demand	5	8	7	14	34

Determine the optimal assignment of products in order to reduce the total transportation cost.

Code No: K0224 **R07** **Set No. 2**

5. Minimize the function $f(x) = 0.65-[0.75/(1+x^2)]-0.65x\tan^{-1}(1/x)$ in the interval [0,3] by the Fibonacci search method. Choose the desired number of function evaluations as 6.

6. Explain the basic idea behind Powell's method and consider the minimization of the function $f(x, y) = 6x^2+2y^2-6xy-x-2y$. If $s_1= \{1\ 2\}$ denotes the search direction, find a direction s_2 which is conjugate to the direction s1.

7. Minimize $f(x, y) = (x-1)^2$ subject to $g_1(x) = 2-x \leq 0$ and $g_2(x) = x-4 \leq 0$ using interior penalty function method,

8. Minimize $Z = y_1^2+y_2^2+y_3^2$ subject to the constraint $y_1+y_2+y_3 \geq 15$ and $y_1, y_2, y_3 \geq 0$ using dynamic programming.

Code No: K0224 **R07** **Set No. 3**

IV B.Tech. II Semester Supplementary Examinations, July/August 2012

OPTIMIZATION TECHNIQUES

(Electrical and Electronics Engineering)

Time: 3 Hours **Max Marks: 80**

Answer any FIVE Questions
All Questions carry equal marks
****

1. Discuss the following:
   a) Redundant Constraints
   b) Post-optimality analysis
   c) Basic solution and
   d) Degeneracy

2. a) Explain the geometrical interpretation of Lagrange multipliers.
   b) Max $z = x^2 + y^2$
   $10 \leq x \geq 20$ and
   $0 \leq y \geq 10$

3. Solve following using the Simplex method:
   Max $z = 3x+4y$
   Subject to
   $x + 3y \geq 15$
   $2x+3y \leq 30$
   $x,y \geq 0$

Code No: K0224 **R07** **Set No. 3**

4. Determine the optimal solution of the following transportation problem:

	D_1	D_2	D_3	D_4	capacity
S_1	21	16	15	3	11
S_2	17	18	14	23	13
S_3	32	27	18	41	19
Demand	6	10	12	15	43

5. Write an algorithm for quadratic interpolation method and find the minimum of $f(x) = x^5 - 5x^3 - 20x + 5$ using the quadratic interpolation method.

6. Using the steepest descent method, Minimize $f(x, y) = x - y + 2x^2 + 2xy + y^2$ starting from the point $x_1 = \{0\ 0\}$.

7. Minimize $f(x, y) = 1/3(x+1)^3 + y$ subject to $g_1(x, y) = 1 - x \leq 0$ and $g_2(x, y) = -y \leq 0$ using exterior penalty function method.

8. a) Explain Bellman's principle of optimality.
   b) What are the limitations of Dynamic Programming?

Code No: K0224 **R07** **Set No. 4**

IV B.Tech. II Semester Supplementary Examinations, July/August 2012
OPTIMIZATION TECHNIQUES
(Electrical and Electronics Engineering)

Time: 3 Hours **Max Marks: 80**

Answer any FIVE Questions
All Questions carry equal marks
****

1. Explain
   a) Design vector
   b) Design constraints
   c) Constraint surface and
   d) Objective function

2. Maximize $z = x^3 + y^3 - 3x^2 y$
   Subject to
   $x = 10$ and
   $y \leq 10$

3. a) Solve using Simplex method:
   Min $z = 3x + y$
   $3x - 2y \leq 6$
   $x + y \geq 2$
   $x, y \geq 0$

   b) Write the dual of the problem specified in 3(a) and find the solution for the dual using the primal solution.

4. Determine the optimal solution of the following transportation problem:

	D_1	D_2	D_3	D_4	SUPPLY
S_1	11	13	17	14	250
S_2	16	18	14	10	300
S_3	21	24	13	10	400
Demand	200	225	275	250	950

5. Write an algorithm for quadratic interpolation method and find the minimum of $f(x) = x^2+(54/x)$ using the quadratic interpolation method.

6. Write the algorithm for Cauchy's method and its convergence criteria.

7. Minimize $(x^2+y-11)^2 + (x+y^2-7)^2$ subject to $(x-5)^2+y^2-26\geq 0$, $x, y \geq 0$ using penalty function method .

8. Minimize $Z = y_1^2+2y_2^2+4y_3$ subject to the constraint $y_1+2y_2+y_3 \leq 8$ and $y_1, y_2, y_3 \geq 0$ using dynamic programming.