Code :R7420204 **1**

IV B.Tech II Semester(R07) Regular Examinations, April 2011
OPTIMIZATION TECHNIQUES
(Electrical & Electronics Engineering)

Time: 3 hours **Max Marks: 80**

Answer any FIVE questions
All questions carry equal marks
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1. Explain the classifications of optimization problems.

2. Find the optimum solution of the following constrained multivariable problem.
Maximize $z = 9 - x_1 - 6x_2 - 4x_3 + 2x_1^2 + 2x_2^2 + x_3^2 + 2x_1x_2 + 2x_1x_3$ subject to $x_1 + x_2 + 2x_3 = 3$.

3. A TV manufacturing company has 3 major departments for its manufacture of two methods A & B monthly capacities are given as follows:

	Per unit time requirement(hour)		Total machine has available in a month
	A	B	
Department1	4	2	1600
Department2	2.5	1	1200
Department3	4.5	1.5	1600

The marginal profit of A is Rs 400/- each and that of model B is Rs 100/-. Assuming that the company sells any quantity of either product due to favorable market conditions determine the optimum output for both models for higher possible profits for a month use graphical method.

4. Describe a method to obtain an initial feasible for a transportation problem by,
   (a) Least cost method
   (b) Vogel's approximation method,
   Compare both the values & comment.

5. Explain the one dimensional minimization methods after classification.

6. Use the method of steepest descent to go two steps towards the maximum of
$f(x) = -2x_1^2 - x_2^2 - x_3^2 - 4x_4^2$ Starting at the point (-1, 1, 0,-1).

7. Classify the constrained optimization techniques & briefly explain each technique.

8. Use dynamic programming technique to solve the following problem.
Max $z = X_1.X_2.X_3.X_4$
Subject to $X_1 + X_2 + X_3 + X_4 = 12$
$X_1, X_2, X_3, X_4 \geq 0$

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Code :R7420204 **2**

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Time: 3 hours **Max Marks: 80**

Answer any FIVE questions
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1. Describe the following:
   (a) Design vector
   (b) Design constraints
   (c) Constraint surface
   (d) Objective function surfaces.
2. (a) Find the maxima and minima if any of
   $F(x) = 4x^3 - 18x^2 + 27x - 7$.
   (b) State & prove the necessary conditions for existence of relative optima in case of single variable optimization.
3. Reduce the following system of equations,
   $2x_1 + 3x_2 - 3x_3 - 7x_4 = 2$
   $x_1 + x_2 - x_3 + 3x_4 = 12$
   $x_1 - x_2 + x_3 + 5x_4 = 8$.
   Into a canonical form with $x_1, x_2 \& x_3$ as basic variables. From this derive all other canonical forms.
4. (a) Explain why BFS of transportation problem has (m+n-1) allocations where m are no. Of rows & n are no.of columns.
   (b) Explain different methods of obtaining BFS in transportation problem.
5. Explain the one dimensional minimization methods after classifications.
6. Minimize $f = 4x_1^2 + 3x_2^2 - 5x_1x_2 - 8x_1$ Starting from the point (0,0) using Powell's method.
7. Consider the problem:
   Minimize $f = x_1^2 + x_2^2 - 6x_1 - 8x_2 + 15$
   Subject to $4x_1^2 + x_2^2 \geq 16, 3x_1 + 5x_2 \leq 15$.
8. Solve the following L.P.P by dynamic programming approach:
   Max$z = 3x_1 + 4x_2$, subject to $2x_1 + x_2 \leq 40, 2x_1 + 5x_2 \leq 180, x_1, x_2 \geq 0$

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Code :R7420204 **3**

IV B.Tech II Semester(R07) Regular Examinations, April 2011
OPTIMIZATION TECHNIQUES
(Electrical & Electronics Engineering)

Time: 3 hours **Max Marks: 80**

Answer any FIVE questions
All questions carry equal marks

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1. Explain the classification of optimization problems.

2. (a) State & explain the necessary & 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 co-ordinate planes to be inscribed in the ellipsoid.

3. (a) State & explain the standard form of LPP.

   (b) Explain the significance of Slack, surplus & artificial variables of LPP.

4. (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
20	25	20	

Requirements

5. Explain the one dimensional minimization methods after classifications.

6. Draw the flow chart for the univariate method, Explain about each block in the flow chart.

7. Determine whether the following optimization problem is convex, concave or neither type.
   Minimize $f = -4x_1 + x_1^2 - 2x_1x_2 + 2x_2^2$ subject to $x_1 + \frac{1}{2}x_2 \leq 3, \frac{1}{2}x_1 - 2x_2 \leq 0$ and $x_i \leq 0, i = 1, 2$.

8. Use dynamic programming technique to solve the following problem,
   Max $z = X_1.X_2.X_3.X_4$
   Subject to $X_1 + X_2 + X_3 + X_4 = 12$
   $X_1, X_2, X_3, X_4 \geq 0$

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Code :R7420204 **4**

IV B.Tech II Semester(R07) Regular Examinations, April 2011
OPTIMIZATION TECHNIQUES
(Electrical & Electronics Engineering)

Time: 3 hours **Max Marks: 80**

Answer any FIVE questions
All questions carry equal marks
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1. Describe the following:
   (a) Design vector
   (b) Design constraints
   (c) Constraint surface
   (d) Objective function surfaces.
2. (a) What are the different types of optimization problems? Explain each with help of suitable objective function & constraints.
   (b) If f(x) is optimal at x=x*, show that the first maximum varying even derivative f(x) at x=x* must be positive for f(x*) to be minimum.
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,
   Min $z = 5x_1 - 2x_2$ subject to $2x_1 + 3x_2 \geq 1$ and $x_1, x_2 \geq 0$
4. (a) If all the sources are emptied & all the destinations are filled, show that $\sum a_i = \sum b_j$ is a necessary & sufficient condition for the existence of a feasible solutions to a transportation problem.
   (b) Prove that there are m+n-1 independent equations is a transportation problem, m & n being the no.of origins & destination and that any one equation can be dropped as the redundant equation.
5. Explain the One dimensional minimization methods after classifications.
6. Show that the 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 with in an interval of uncertainty 0.1.
7. Classify the constrained optimization techniques & briefly explain each technique.
8. Solve the following LPP by dynamic programming approach.
   Max$z = 8x_1 + 7x_2$ subject to $2x_1 + x_2 \leq 8, 5x_1 + 2x_2 \leq 15$, $x_1, x_2 \geq 0$

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