Code: R7420204 **R7**

B.Tech IV Year II Semester (R07) Supplementary Examinations March/April 2013

OPTIMIZATION TECHNIQUES

(Electrical and Electronics Engineering)

Time: 3 hours Max Marks: 80

Answer any FIVE questions

All questions carry equal marks

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1 Classify optimization problems and its application to electrical engineering problems.

2 Explain in detail:

(a) Multivariable optimization with equality constraints.

(b) Kuhn-tucker conditions by taking suitable example.

3 A ship is to carry ‘3’ types of liquid cargo x, y and z. There are 3,000 liters of x available, 2000 liters of y available and 1,500 liters of z available. Each liter of x, y and z sold fetches a profit of Rs. 20, Rs. 35 and Rs. 40 respectively. The ship has 3 cargo holds A, B and C, of capacities 2000, 2,500 and 3,000 liters respectively. Form stability considerations. It is required that each hold be filled in the same proportion. Formulate the problem of loading the ship as a linear programming problem. State clearly all decision variables and constraints.

4 The following data is given:

$$\begin{array}{cc}
 & \text{Destinations} \\
 & \begin{array}{ccc} 1 & 2 & 3 \end{array} \quad \text{Capacities} \\
\text{Source 2} & \begin{bmatrix} 2 & 2 & 3 \\ 4 & 1 & 2 \\ 1 & 3 & X \end{bmatrix} \quad \begin{array}{c} 10 \\ 15 \\ 14 \end{array} \\
\text{Demands} & \begin{array}{ccc} 20 & 15 & 30 \end{array}
\end{array}$$

The cost of shipment from third source to the third destination is not known. How many units should be transported from sources to destinations so that total cost of transporting all units to their destinations is a minimum?

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5 Given the non-linear programming problem,
Minimize $z = x_1 - 6x_2 + \frac{x_1^2 + x_2^2}{3}$ subject to the constraints:
$2x_1 + 3x_2 \leq 6, x_1 + 4x_2 \leq 6; x \geq 0, x_2 \geq 0$. Check whether the given function is convex. If so, find x_1 and x_2 and evaluate z.

6 Explain the Powell's method.

7 Use the method of separable convex programming for solving the following non - linear programming problem maximize f(x) = $x_1 + x_2^2$ subject to the constraints:
$3x_1 + 2x_2^2 \leq 9;\ x_1 \geq 0\ and\ x_2 \geq 0.$

8 Use dynamic programming to show that
Z = P_1 log $P_1 + P_2$log $P_2 + ------ + P_n$ log P_n and $Pj \geq 0$ is a minimum when $P_1 = P_2 = ----= P_n = {}^1/_n.(j = 1,2 ----, n)$

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