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Total Number of Pages: 02

M.TECH
PEPE103

1st Sem M Tech Regular/ Back Examination – 2015-16

OPTIMIZATION TECHNIQUE

BRANCH(S): PE/PED/

Time: 3 Hours

Max marks: 70

Q.CODE:T913

**Answer Question No.1 which is compulsory and any five from the rest.
The figures in the right hand margin indicate marks.**

- Q1 Answer the following questions: (2 x 10)
- What is the difference between a bound point and a free point in the design space?
 - Define a stochastic programming problem and give two practical examples.
 - What is duality?
 - Can an artificial variable be in the basis at the optimum point of an LP problem?
 - What is a Unimodal function? Give an example.
 - What is the difference between Direct Search Methods and Descent Methods in Unconstrained optimization problem?
 - Why is a conjugate directions method preferred in solving a general nonlinear problem?
 - The univariate method is a conjugate directions method. True or false, justify
 - Why are the components numbered in reverse order in dynamic programming?
 - How can you solve an integer nonlinear programming problem?
- Q2 a) Minimize $f(Y) = \frac{1}{2}(y_1^2 + y_2^2 + y_3^2 + y_4^2)$ subjected to (10)
- $$g_1(Y) = y_1 + 2y_2 + 3y_3 + 5y_4 - 10 = 0$$
- $$g_2(Y) = y_1 + 2y_2 + 5y_3 + 6y_4 - 15 = 0$$
- Q3 Minimize $f = 2x_1 + 3x_2 + 2x_3 - x_4 + x_5$ (10)
Subject to the constraints:
- $$3x_1 - 3x_2 + 4x_3 + 2x_4 - x_5 = 0$$
- $$x_1 + x_2 + x_3 + 3x_4 + x_5 = 2$$
- $$x_i \geq 0 \quad i = 1 \text{ to } 5$$
- Using 2-step simplex method.
- Q4 Minimize $f(x_1, x_2) = x_1 - x_2 + 2x_1^2 + 2x_1x_2 + x_2^2$ from the starting point $X_1 = \begin{bmatrix} 0 \\ 0 \end{bmatrix}$ using (10)

powell's method.

Q5 Perform two iterations of Newton's method to minimize the function $f(x_1, x_2) = (x_1 - x_2^2)^2 + (1 - x_1)^2$ from starting point $\begin{bmatrix} -1.2 \\ 1.0 \end{bmatrix}$ (10)

Q6 Perform two iterations of the Fletcher-Reeves method to minimize the function given in Problem below: (10)

$$f(x_1, x_2) = (x_2 - x_1^2)^2 + (1 - x_1)^2$$

from the stated starting point $\begin{bmatrix} -1.2 \\ 1.0 \end{bmatrix}$

- a) What is karmakar's algorithm? Write down it use in power system (5)
- b) Write down the algorithm of finding the dual affine. (5)

Q8 Write short notes on any (5 x 2)

- a) Simulated annealing
- b) Evolutionary Programming
- c) Genetic algorithm
- d) Finite Element Based Optimization