Registration no: $\square$

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M.TECH

PEPE103

## $1^{\text {st }}$ Sem M Tech Regular/ Back Examination - 2015-16 <br> OPTIMIZATION TECHNIQUE <br> BRANCH(S): PE/PED/ <br> Time: 3 Hours <br> Max marks: 70 <br> Q.CODE:T913 <br> 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:
a) What is the difference between a bound point and a free point in the design space?
b) Define a stochastic programming problem and give two practical examples.
c) What is duality?
d) Can an artificial variable be in the basis at the optimum point of an LP problem?
e) What is a Unimodal function? Give an example.
f) What is the difference between Direct Search Methods and Descent Methods in Unconstrained optimization problem?
g) Why is a conjugate directions method preferred in solving a general nonlinear problem?
h) The univariate method is a conjugate directions method. True or false, justify
i) Why are the components numbered in reverse order in dynamic programming?
j) How can you solve an integer nonlinear programming problem?

Q2
a) Minimize $f(Y)=\frac{1}{2}\left(y_{1}^{2}+y_{2}^{2}+y_{3}^{2}+y_{4}^{2}\right)$ subjected to

$$
\begin{equation*}
g_{1}(Y)=y_{1}+2 y_{2}+3 y_{3}+5 y_{4}-10=0 \tag{10}
\end{equation*}
$$

$$
g_{2}(Y)=y_{1}+2 y_{2}+5 y_{3}+6 y_{4}-15=0
$$

Q3
Minimize $f=2 x_{1}+3 x_{2}+2 x_{3}-x_{4}+x_{5}$
Subject to the constraints:

$$
\begin{gathered}
3 x_{1}-3 x_{2}+4 x_{3}+2 x_{4}-x_{5}=0 \\
x_{1}+x_{2}+x_{3}+3 x_{4}+x_{5}=2 \\
x_{i} \geq 0 \quad i=1 \text { to } 5
\end{gathered}
$$

Using 2-step simplex method.

Q4 Minimize $f\left(x_{1}, x_{2}\right)=x_{1}-x_{2}+2 x_{1}^{2}+2 x_{1} x_{2}+x_{2}^{2}$ from the starting point $X_{1}=\left[\begin{array}{l}0 \\ 0\end{array}\right]$ using
powell's method.
Q5 Perform two iterations of Newton's method to minimize the function $f\left(x_{1}, x_{2}\right)=$ $\left(x_{1}-x_{2}^{2}\right)^{2}+\left(1-x_{1}\right)^{2}$ from starting point $\left[\begin{array}{c}-1.2 \\ 1.0\end{array}\right]$

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

$$
\begin{align*}
& f\left(x_{1}, x_{2}\right)=\left(x_{2}-x_{1}^{2}\right)^{2}+\left(1-x_{1}\right)^{2}  \tag{10}\\
& \text { from the stated starting point }\left[\begin{array}{c}
-1.2 \\
1.0
\end{array}\right]
\end{align*}
$$

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

Q8 Write short notes on any
a) Simulated annealing
b) Evolutionary Programming
c) Genetic algorithm
d) Finite Element Based Optimization

