R09

Code No: C2101

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
M.Tech I - Semester Examinations, March/April 2011
OPTIMIZATION TECHNIQUES AND APPLICATIONS
(THERMAL ENGINEERING)

Time: 3hours **Max. Marks: 60**

Answer any five questions
All questions carry equal marks
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1. Minimize Y = (x-4) $(x-6)^3$ $(x-1)^2$ by using Fibonacci method. Take initial interval of uncertainty as [8, 32] and total number of experiments as 6. Calculate achieved accuracy. [12]

2. $Min\ y = 25600x^4 + 16x^2 - 8x + 1$ using Quadratic interpolation method. Take step size as 0.1. [12]

3. a) Define gradient of function. Explain its characteristics.

   b) Solve the following problem by Fletcher-Reeves method.
   $Min\ y = 10 - x_1 + x_1x_2 + x_2^2$. Take a starting point as (1, 1). [12]

4. a) State arithmetic-geometric inequality theorem. Explain how it is used in deriving dual problem for a given unconstrained geometric problem.
   b) Solve the following GP problem $Min\ f = 4x_1^2x_2^{-3} + 5x_1^{-3}x_2 + 6x_1x_2$, $x_{1,\&}\ x_2 > 0$. [12]

5. $Max\ f = 5x_1 + 12x_2 + 4x_3$ st
   $x_1 + 2x_2 + x_3 \le 5$
   $2x_1 - x_2 + 3x_3 = 2$ and $x_i \ge 0$,
   a) Solve LPP
   b) Find the effect of change C to (4, 10, and 4) from (5, 12, and 4). [12]

6. a) A tourist car has 25 taxis in operation. He keeps three drivers as reserve to attend the calls in case the scheduled driver reports sick. The probability distribution of sick drivers is as follows:

Number of sick	0	1	2	3	4	5
Probability	0.20	0.25	0.20	0.15	0.12	0.08

   Simulate for 12 days and estimate i) The utilization of reserve drivers and
   ii) Probability that at least one taxi will be off the road due to non-availability of a driver. Take random numbers as 82 89 78 24 53 61 18 45 04 23 50 77.
   b) Write important features of simulation languages. [12]

CONT….2

7. Solve the following mixed integer programming problem

$Max\ Z = 4x_1 + 6x_2 + 2x_3 \quad st$

$4x_1 - 4x_2 \le 5, -x_1 + 6x_2 \le 5, -x_1 + x_2 + x_3 \le 5 \quad x_i \ge 0$

x_1 and x_3 are integers. [12]

8. Write short notes on any **two** of the following

a) Pattern direction methods-Hook-Jeeves method in detail

b) Bellman's principle of optimality & its application

c) Stochastic linear programming. [12]

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