R17

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
M.Tech I Semester Examinations, January - 2018
OPTIMIZATION TECHNIQUES AND APPLICATIONS
(Common to EPS, ES, PEED, VLSI System Design)

Time: 3hrs   Max.Marks:75

Note: This question paper contains two parts A and B.
Part A is compulsory which carries 25 marks. Answer all questions in Part A.
Part B consists of 5 Units. Answer any one full question from each unit. Each
question carries 10 marks and may have a, b, c as sub questions.

PART - A

5×5 Marks = 25

1.a) What is quadratic convergence? [5]
  b) How are the search directions generated in the Fletcher–Reeves method? [5]
  c) Why simulations for solving real life problems? [5]
  d) Write the applications of dynamic programming. [5]
  e) How is the degree of difficulty defined for a constrained geometric programming problem? [5]

PART - B

5×10 Marks = 50

2. Min $f = x^2 - 10e^{0.1x}$ in the interval (-10, 5) to the accuracy of 10%. Use Fibonacci Method. Calculate the actual accuracy achieved. [10]

OR

3. Minimize the function $f(X) = X_1 - X_2 - 2X_1^2 + 2X_1X_2 + X_2^2$ starting from the point $X_1 = \{0,0\}$ along with direction $S = \{-1\ 0\}$ using the quadratic interpolation method within an initial step length of 0.1. [10]

4. Minimize $f = 4x_1^2 + 3x_2^2 - 5x_1x_2 - 8x_1$ starting from point (0, 0) using Powell's method. [10]

OR

5. Minimize $f(x_1, x_2) = x_1 - x_2 + 2x_1^2 + 2x_1x_2 + x_2^2$ starting from the point $x_1 = (0,0)$ using Fletcher–Reeves method. [10]

6. Solve the following Linear programing problem by simplex method
Maximize $Z = 3x_1 + 5x_2$,
subjected to the constraints: $3x_1 + 2x_2 \leq 18$, $x_1 \leq 4$, $x_2 \leq 6$, and $x_1, x_2 \geq 0$.
If the cost coefficient of x_1 is kept fixed, find the range for the cost coefficient of x_2 without affecting the optimal solution. [10]

OR

7.a) When do you use Simulation technique? Give some examples for simulation where simulation is the only alternative technique to model?
  b) What is the difference and application of inventory and queuing models. [5+5]

8. Solve the following problem using Gomory's cutting plane method:

Maximize $f = X_1 + 2X_2$

subject to

$X_1 + X_2 \leq 7$

$2X_1 \leq 11, 2X_2 \leq 7$

$X_i \geq 0$ and integer, $i = 1, 2$ [10]

OR

9. Apply the dynamic programming to solve the following problem:

Maximize $f(x) = 5x_1 + 10x_2$

$10x_1 + 5x_2 \leq 250$

$4x_1 + 10x_2 \leq 200$

$2x_1 + 3x_2 \leq 900$

$x_1, x_2 \geq 0$ [10]

10.a) Write short notes on stochastic linear programming.

b) How does correlation coefficient relate two random variables?   [5+5]

OR

11. Consider inventory problem in which ordering quantity $q > 0$ is to be found such that Minimize $f(q) = 1/2 C_1 q + C_2 R/q$ where C_1, C_2 and R are parameters. Use geometric programming model and solve it.   [10]

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