

Code No: 5421AF

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

M. Tech I Semester Examinations, January - 2018

ADVANCED OPTIMIZATION TECHNIQUES AND APPLICATIONS

(Thermal Engineering)

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) Write the applications of cubic interpolation method. [5]
- b) Describe the importance of pattern search method. [5]
- e) Write the applications of dynamic programming. [5]
- d) Describe about sensitivity analysis in brief. [5]
- e) Write the formulation of integer programming. [5]

PART - B

5 × 10 Marks = 50

2. 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. [10]

OR

3. Minimize $y = 25600x^4 + 16x^2 - 8x + 1$ using Quadratic interpolation method. Take step size as 0.1. [10]

4. Minimize $f = 2x_1^2 + x_2^2$ from the starting point (1, 2) using the Univariate method (Two iterations only). [10]

OR

5. Define gradient of function. Solve the following problem by Fletcher-Reeves method. Min $y = 10 - x_1 + x_1 x_2 + x_2^2$. Take a starting point as (1, 1). [10]

6. How is the degree of difficulty defined for a constrained geometric programming problem? Develop and explain about a Constrained Geometric Programming problem? [10]

OR

7. Solve the following L.P.P. by dynamic programming approach:

$$\text{Max } Z = 3x_1 + 4x_2,$$

$$\text{Subject to } 2x_1 + x_2 \leq 40$$

$$2x_1 + 5x_2 \leq 180$$

$$x_1, x_2 \geq 0.$$

[10]

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8. Maximize $f(x) = 6x_1 + 8x_2$
Subjected to $5x_1 + 10x_2 \leq 60$
 $4x_1 + 4x_2 \leq 40$
 $x_1, x_2 \geq 0$

Conduct the sensitivity analysis under the following conditions:

- a) Check whether the addition of the constraint $7x_1 + 2x_2 \leq 65$, affects the optimality. If it does, find the new optimum solution.
b) Check whether the addition of the constraint $6x_1 + 3x_2 \leq 48$ affects the optimality. If it does, find the new optimum solution. [5+5]

OR

- 9.a) Write about the Simulation and its types.
b) Write about the applications of inventory system. [5+5]

10. Solve the following integer programming
Max $f = 3x_1 - x_2$

Subject to $3x_1 - 2x_2 \leq 3$
 $-5x_1 - 4x_2 \leq -10$
 $x_1, x_2 \geq 0$ and integers

[10]

OR

11. Explain the formulation of stochastic linear dynamic programming. [10]

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