Code No: 56021 **R09**

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
B. Tech III Year II Semester Examinations, April - 2018
ENGINEERING OPTIMIZATION
(Common to AE, ME)

Time: 3 hours **Max. Marks: 75**

Answer any five questions
All questions carry equal marks
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1.a) Discuss the demerits of optimization method when a gap exists between the optimizer and the implementer.
b) Name some of the areas of applications of optimization in various fields of engineering. [7+8]

2.a) What is interpolation? Explain the method of quadratic interpolation.
b) Min $f(x) = x^2 - 10\, e^{0.1x}$ in the interval (-10, 5) to the accuracy 10% using Fibonacci method. [7+8]

3.a) What are the characteristics of a direct search method?
b) Minimize the function $f(x_1, x_2, x_3) = x_1^2 + 2x_2^2 + (1/3)\, x_3^2$ using Hooke–Jeeves method with $\Delta x_1 = \Delta x_2 = \Delta x_3 = 1/2$ and starting point as (–1, 1, 2). [7+8]

4.a) Write down the merits and demerits of "Cauchy's Steepest Descent Method".
b) Perform two iterations of Cauchy's steepest descent method to minimize the function $f(x_1, x_2) = x_1 - x_2 + 2x_1^2 + 2x_1x_2 + x_2^2$ starting from (0, 0). [7+8]

5.a) State the Kuhn–Tucker conditions.
b) Maximize $f = 8x_1 + 4x_2 + x_1x_2 - x_1^2 - x_2^2$
Subject to $2x_1 + 3x_2 \le 24$
$-5x_1 + 12x_2 \le 24$
$x_2 \le 5$
By applying Kuhn–Tucker conditions. [7+8]

6.a) What is arithmetic–geometric inequality? Explain.
b) Define and explain the terms: (i) Cutting plane (ii) Gomory's constraint. [7+8]

7.a) Define linear programming problem. Give example.
b) A company wants to purchase atmost 180 units of a product. There are two types of the product, M_1 and M_2 available. M_1 occupies 2 ft^3, cost Rs. 12/- and the company makes a profit of Rs. 3/-. M_2 occupies 3ft^3, costs Rs. 15/- and the company makes a profit of Rs 4/- If the budget is Rs. 15,000/- and the warehouse has 3000 ft^3 for product. Formulate the problem as a linear programming model. [7+8]

8.a) What are the situations that warrant the use of simulation as the most advisable optimization technique? Give some examples.
b) Describe the steps involved in the general method of simulation. [8+7]

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