Code No: 56021 **R09**

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
B. Tech III Year II Semester Examinations, May - 2019
ENGINEERING OPTIMIZATION
(Common to ME, AE)

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

Answer any five questions
All questions carry equal marks
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1.a) What do you understand by optimization? How would you represent an optimization problem?
b) Explain the terms 'validation' and 'sensitivity' in the context of optimization modelling. [7+8]

2.a) Explain the Fibonacci method of minimization. What are the limitations of this method?
b) Minimize $Y= 5x^4 +16x^2- 8x+1$ using Quadratic interpolation method. Take step size as 0.1. Use a maximum of two refits. [7+8]

3.a) Explain the univariate method in detail with the help of a flow chart.
b) Use Powell's method to minimize the function $f(x_1, x_2) = x_1^2 + 2x_2^2$ with the starting point (1, 2). [7+8]

4.a) What is gradient? Compare and contrast the strengths and weaknesses of pattern search methods and gradient methods.
b) Starting from (0, 0), carry out at least four iterations for the problem using the method of steepest descent: minimize $f(x) = (x_1 - x_2^2)^2 + (1 - x_2^2)$. [7+8]

5.a) What are the working rules for solving a multidimensional equality constrained optimization by the Lagrange multiplier method?
b) By Lagrange multiplier method
Minimize $f(x_1, x_2) = (x_1 - 1)^2 + (x_2 + 1)$ subject to $x_1^2 - x_2 = 2$. [8+7]

6.a) What is a branch-and-bound method?
b) How is the degree of difficulty defined for a constrained geometric programming problem? [7+8]

7.a) What are key row, key column and key element in a simplex tableau? How do you determine them?
b) Mayukha & company produce two types of toys. Labour time required for first type is twice that of the second. If the first type alone is produced, the capacity is sufficient to produce 1000 numbers per day. The demand potential is 300 and 500 toys. The profits per toy are Rs. 10 and Rs, 8 respectively. Formulate the L.P. problem and solve by simplex method. [7+8]

8.a) What is the role of simulation in solving engineering problems? Discuss its pros and cons in solving engineering problems.
b) Build a simulation model for a system of using telephone at a phone booth and validate this model. [7+8]

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