SUBJECT CODE:- 8168
FACULTY OF ENGINEERING AND TECHNOLOGY
M.E.(Mechanical) Examination Nov/Dec 2015
Advanced Optimization Techniques
(Revised)

[Time: Three Hours]   [Max. Marks: 80]

"Please check whether you have got the right question paper."

N.B   i) Attempt any three questions from each section.
          ii) Assume suitable data, if necessary.
          iii) Use of non-programmable calculator is allowed.   .

Section A

Q.1   Find the minimum of f = x(x − 3/2) in the interval (0, 1) to within 10% of the exact value.   13

Q.2   Minimize f(x)=0.65-[0.75/(1+x^2)]-0.65xtan^{-1}(1/x) in the interval (0, 3) by the Fibonacci method using n = 6.   13

Q.3   Minimize $f(x_1, x_2) = x_1 - x_2 + 2x_1^2 + 2x_1x_2 + x_2^2$ from the starting point $X_1 = \begin{Bmatrix} 0 \\ 0 \end{Bmatrix}$ using Powell's method.   13

Q.4   Write down K –T conditions for the following NLP   13
        Minimize $f(x) = (x^2 + x_2 - 11)^2 + (x_1 + x_2^2 - 7)^2$
        Subject to $g_1(x) = 26 - (x_1 - 5)^2 - x_2^2 \geq 0$
                   $g_2(x) = 20 - 4x_1 - x_2 \geq 0$
                   $x_1, \ x \geq 0$

Q.5   Attempt any two (write notes)   14
            a) Optimality criteria
            b) Single variable optimization
            c) Sensitivity analysis

Section-B

Q.6   Solve the following LPP graphically   13
        Minimize $f = 3x_1 + 2x_2$
        Subject to $8x_1 + x_2 \geq 8$
                   $2x_1 + x_2 \geq 6$
                   $x_1 + 3x_2 \geq 6$
                   $x_1 + 6x_2 \geq 8$
                   $x_1 \geq 0, \ x_2 \geq 0$

Q.7   Solve the following LPP using Charmes Penalty method   13
        Minimize $f = 3x + 2y$
        Subject to $21x - 4y \geq -36$
                   $x + 2y \geq 6$
                   $6x - y \leq 72$
                   $x \geq 0, \ y \geq 0$

Q.8   a)   What is genetic algorithm? Illustrate with an example.   07
            b)   What is simulated annealing? Explain with an example.   06

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Q.9   Solve by Gomorig's cutting plane algorithm   13
      Minimize $f = 3x_1 - 4x_2$
      Subject to $3x_1 - x_2 + x_3 = 12$
                 $3x_1 + 11x_2 + x_4 = 66$
                 $x_i \geq 0 \ all \ x_i \ are \ integers.$

Q.10 Write any two (write notes)   07
      a) Geometric programming
      b) LPP
      c) L-T conditions

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