Total No. of Printed Pages:2

SUBJECT CODE NO:- P-8011
FACULTY OF ENGINEERING AND TECHNOLOGY
M.E. (Mechanical) Examination May/June 2017
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 question for each section
ii) Assume additional data if necessary
iii) Use of non-programing calculator is allowed

Section A

Q.1 Find the minimum of 13

$f(x) = x(x - 3/2)$ in the interval (0,1) within 10% of the exact value using exhaustive search method

Q.2 Find minimum of the function 13

$$f(x) = 0.65 - \frac{0.75}{1+x^2} - 0.65\, x \tan^{-1}(1/x)$$

Using secant method with initial step size of $t_o = 0.1$, $x_1 = 0.0$ and $\epsilon = 0.01$

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

Q.4 Write down K-T condition for the following problem 13
Minimize $f(x) = (x_1^2 + x_2 - 11)^2 + (x_1 + x_2^2 - 7)^2$

Subject to $g_1(x) = 26 - (x_1 - 5)^2 - x_2^2 \geq 0$

$$g_2(x) = 20 - 4x_1 - x_2 \geq 0$$

$$x_1 \; x_2 \geq 0$$

Q.5 Write short notes on (any two) 14
i) Region elimination method
ii) Optimality criteria
iii) single variable optimization

Section B

Q.6 Solve by two phase method 13
Minimize $f(x) = 2x_1 + 3x_2 + 2\,x_3 - x_4 + x_5$

Subject to $3x_1 - 3x_2 + 4x_3 + 2x_4 - x_5 = 0$

$$x_1 + x_2 + x_3 + 3x_4 + x_5 = 2$$

$$x_i \geq 0 \quad i = 1\ to\ 5$$

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Q.7 Solve the following integer programming problem 13

Maximize $f(x) = 3x_1 + 4x_2$

Sub to $3x_1 - x_2 \leq 12$

$3x_1 + 11x_2 \leq 66$

$x_1 \geq 0, \quad x_2 \geq 0 \quad x_1 \text{ and } x_2$ are integers.

Q.8 Solve the following using simulated Annealing 13

Minimize $f(x) = 500 - 20x_1 - 26x_2 - 4x_1x_2 + 4x_1^2 + 3x_2^2$

Q.9 a) What do you mean by genetic Algorithms? 07

b) Describe simulated annealing 06

Q.10 Write short notes on (any two) 14

i) NLP

ii) Dual Phase method

iii) Constrained optimization

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