Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

M. E. - SEMESTER – III • EXAMINATION – WINTER 2012

Subject code: 733001 **Date: 30/12/2012**

Subject Name: Advance Process Optimization

Time: 10.30 am – 01.00 pm **Total Marks: 70**

Instructions:

1. **Attempt all questions.**
2. **Make suitable assumptions wherever necessary.**
3. **Figures to the right indicate full marks.**

Q.1 Maximize P with respect to x_i when it is subject to restrictions that **(14)**

$11x_1 + 3x_2 - 2x_3 \geq P$

$4x_1 + 5x_2 + x_3 \geq P$

$6x_1 + 10x_2 + 5x_3 \geq P$

$x_1 + 8x_2 + 12x_3 \geq P$

$x_1 + x_2 + x_3 = 1$, $x_i \geq 0$

Q.2 (a) Discuss: Artificial Neural Network. **07**

(b) Find the area of the largest rectangle with its lower base on the x-axis and whose corners are bounded at the top by the curve $y = 10 - x^2$. **07**

OR

(b) A box with a square base and open top is to hold 1000 cm3. Find the dimensions that require the least material (assume uniform thickness of material) to construct the box. **07**

Q.3 Find the minimum of the function, **14**

$$y = (x_1 - 0.5)^2 + (x_2 - 1.0)^2$$

Subject to the restriction that

$$g = x_1^2 + 2x_2^2 - 4 \leq 0$$

OR

Q.3 (a) Discuss Ant Colony Optimization in detail. **07**

(b) Discuss about TABU Search for optimization in detail. **07**

Q.4 Using the Powell method, conduct three stages of search seeking the minimum of the objective function **14**

$y = x_1^2 + 3x_1^2x_2^2 - 2x_1x_2x_3 + 5x_3^2$

OR

Q.4 Use the Fibonacci method to seek the position of the maximum value of the function **14**

$$y = 9x - 0.1x^2$$

In the range $0 \leq x \leq 100$ to within an accuracy of 0.1 percent of the original range. Give the results of the calculations for the first five stages only.

Q.5 (a) Discuss optimization of liquid-liquid extraction process. **07**

(b) Discuss optimizing the economic operation of a fixed-bed filter. **07**

OR

Q.5 (a) Explain Dynamic Programming with the help of an example. **07**

(b) Find the minimum of, **07**

$$y = x_1^2 + 2x_2^2$$

Subject to,

$$3x_1 + x_2 \geq 2$$

$$x_1 + 2x_2 \geq 3$$

Using a penalty function method.

****