Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–VIII • EXAMINATION – SUMMER 2014

Subject Code: 182605 **Date: 03-06-2014**

Subject Name: Rubber Process & Product Computer Aided Design

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

Instructions:

1. **Attempt all questions.**
2. **All notations used have conventional meaning.**
3. **Make suitable assumptions wherever necessary.**
4. **Figures to the right indicate full marks.**

Q.1(a) Define the term: - Design. How the Simulation differs from Design? **(06)**

Q.1(b) What is Optimization? Give examples of optimization in rubber industries. **(04)**

Q.1(c) What are essential features of optimization problems? **(04)**

Q.2(a) Explain the concept of Fitting models to Data. **(07)**

Q.2(b) Based on Least square method Fit the model $y=\beta_0+\beta_1 x$ to the following data. Where y is the measured response and x is the dependent variable. **(07)**

x	y
0	0
1	2
2	4
3	6
4	8
5	10

OR

Q.2(b) To Schedule the production in two plants, A&B each of which can manufacture two products. no 1 & no 2.How should scheduling take place to maximise profits while meeting the market requirements based on the following data **(07)**

Plant	Material processed kg/day		Profit Rs/Kg	
	1	**2**	**1**	**2**
A	M_{A1}	M_{A2}	S_{A1}	S_{A2}
B	M_{B1}	M_{B2}	S_{B1}	S_{B2}

How many days per year (365) should each plant operate processing each kind of material? Formulate the problem and discuss any one method to solve the problem.

Q.3(a) Write algorithm steps for simple GA for optimization and explain its Working with flow chart. **(07)**

Q.3(b) Explain the roulette wheel selection & Rank selection in GA. **(07)**

OR

Q.3(a) Discuss effect of population size, number of generations, Cross over probability and mutation probability on performance of GA. **(09)**

Q.3(b) Describe the basic components of GA. **(05)**

------P.T.O.------

Q.4(a) What is black box principle? Schematically represent the structure of a simple artificial neural network and explain the terms involved. **(07)**

Q.4(b) Using Newton's method minimize a non-quadratic function $f(x) = x^4 - x + 1$. For a starting point of $x=3$, minimize $f(x)$ until the change in x *is* less than 10^{-7}. **(07)**

OR

Q.4(a) If the optimization problem is to minimize objective function $y = 4x_1 - 3x_2$ subject to the constraints **(08)**

$$x_1 - 3x_2 \leq 4$$
$$2x_1 + 4x_2 \leq 15$$
$$-x_1 + x_2 \leq 6$$
$$x_1, x_2 \geq 0$$

Find the optimum values of x_1, x_2 and y

Q.4(b) Describe in brief classification of Learning Rule & Training of an ANN. **(06)**

Q.5(a) Explain the basic concepts of Back Propagation algorithm for ANN. **(08)**

Q.5(b) What is Idealization? Write down the sequence of steps in performing a Finite Element Analysis. **(06)**

Or

Q.5(a) Explain the theory and working of FEA and discuss basics of FEA for Rubber product design. **(08)**

Q.5(b) List the method of deciding the concavity or convexity of a function. Explain any one in detail. **(06)**