

Seat No./Enrollment No.: _____

GUJARAT TECHNOLOGICAL UNIVERSITY
BACHELOR OF ENGINEERING – SEMESTER 6 – EXAMINATION – SUMMER 2026

Subject Code: 3160619

Date: 26/05/2026

Subject Name: Soft Computing Techniques

Time: 10:30 AM TO 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.**
- 4. Simple and non-programmable scientific calculators are allowed.**

- Q.1** (a) Define soft computing and its objectives. **03**
(b) Compare soft computing with hard computing. **04**
(c) Explain the application of soft computing techniques to pattern recognition **07**
- Q.2** (a) Enumerate the difference between centroid method and center of largest area method. **03**
(b) Write a short note on fuzzy propositions. **04**
(c) Explain various methods of defuzzification process. **07**
- OR
- Q.2** (c) Discuss about the four modes of fuzzy reasoning. **07**
- Q.3** (a) Explain any three types of membership functions used in fuzzification process. **03**
(b) Differentiate between Mamdani FIS and Sugeno FIS. **04**
(c) Discuss the main components of an evolutionary algorithm. **07**
- OR
- Q.3** (a) Differentiate between phenotype and genotype. **03**
(b) Mention the properties for matrix relations that define fuzzy equivalence relation. **04**
(c) With a suitable application case study, explain a fuzzy logic controller. **07**
- Q.4** (a) Discuss about the learning process in Boltzmann machine. **03**
(b) Differentiate between Roulette wheel selection and tournament selection. **04**
(c) Explain the training algorithm used in Adaline network. **07**
- OR
- Q.4** (a) Sketch the model of artificial neuron. **03**
(b) Implement Optimization of Traveling Salesman Problem using Genetic algorithm approach. **04**
(c) Explain the single perceptron with its learning algorithm and its separability and convergence property. **07**
- Q.5** (a) State the techniques for proper choice of learning rate. **03**
(b) Explain Why the McCulloch Pitts neuron is widely used in logic functions. **04**

- (c) Describe the steps involved to solve any one of the optimization problems using Hopfield neural network. **07**

OR

- Q.5** (a) Distinguish between recurrent and non-recurrent networks. **03**
(b) Write the benefits of integrating GAs with neural networks. **04**
(c) Explain how a GA could evolve the membership functions of a fuzzy controller. **07**
