H   Roll No. ....

TCS–821

B. TECH. (CSE) (EIGHTH SEMESTER) END SEMESTER EXAMINATION, May, 2023

SOFT COMPUTING

Time : Three Hours

Maximum Marks : 100

Note : (i) All questions are compulsory.

(ii) Answer any *two* sub-questions among (a), (b) and (c) in each main question.

(iii) Total marks in each main question are **twenty**.

(iv) Each sub-question carries 10 marks.

1. (a) Explain the concept of artificial neural networks (ANNS) and how they are inspired by biological neural networks.

(CO1)

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(b) Describe the architecture of an artificial neural network, including the input layer, hidden layers (if any), and output layer.

(CO1)

(c) Explain the McCulloch-Pitts neuron model and its significance in understanding the basic functioning of artificial neural networks. (CO1)

2. (a) Explain the architecture of a single-layer perception and its basic components.

(CO2)

(b) Compare and contrast the Hopfield network and Bidirectional Associative Memory (BAM) models. (CO2)

(c) Explain the architecture and working principle of a backpropagation neural network. (CO2)

3. (a) Explain the concept of fuzzy sets and their significance in handling uncertain or imprecise information. (CO3)

(b) Define fuzzy relations and discuss their role in modeling relationships between fuzzy sets.   (CO3)

(c) What is fuzzy composition, and why is it important in fuzzy systems ?   (CO3)

4. (a) Define fuzzy variables and explain their role in representing linguistic terms or concepts in fuzzy logic.   (CO4)

(b) Explain the different types of membership functions commonly used in fuzzy logic, such as triangular, trapezoidal, Gaussian, and sigmoidal functions.   (CO4)

(c) Describe the Takagi-Sugeno fuzzy rule system and the Mamdani fuzzy rule system.   (CO4)

5. (a) Describe the biological inspiration behind genetic algorithms and how they mimic the process of natural selection and evolution.   (CO5)

(b) Discuss the process of encoding solutions into chromosomes and genes, and explain the importance of choosing an appropriate representation for the problem domain.

(CO5)

(c) Present a step-by-step overview of a basic genetic algorithm, including the initialization of the population, evaluation of fitness, selection, crossover, mutation, and termination conditions. (CO5)

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