

QP CODE: 26801746



Reg No :

Name :

INTEGRATED M.Sc. DEGREE EXAMINATION, APRIL 2026

Eight Semester

INTEGRATED M.Sc. COMPUTER SCIENCE-ARTIFICIAL INTELLIGENCE AND MACHINE
LEARNING

ELECTIVE - ICSA8EB1 - SOFT COMPUTING TECHNIQUES

2020 Admission Onwards

6D3664D2

Time: 3 Hours

Weightage: 30

Part A (Short Answer Questions)

*Answer any **eight** questions.*

Weight 1 each.

1. Discuss the role of approximation in soft computing. How does it differ from the exact solutions sought in hard computing?
2. What is an integrate-and-fire neuron model?
3. Explain the concept of stability-plasticity dilemma in ART networks.
4. Compare and contrast absolute and relative convergence criteria used in Genetic Algorithms. When would each criterion be more appropriate?
5. Briefly explain the concept of fitness sharing in Genetic Algorithms. How does fitness sharing help to prevent premature convergence?
6. Define classical relations and fuzzy relations. Highlight the key differences between these two types of relations.
7. Outline the steps involved in constructing a fuzzy rule base for a specific application domain. Highlight the considerations for defining fuzzy sets and rules.
8. Discuss the application of fuzzy decision-making techniques in real-world scenarios, such as in engineering, finance, or medical diagnosis.
9. Explain the role of neural networks in soft computing. How are neural networks trained using techniques like backpropagation in hybrid systems?
10. How does Fuzzy ARTMAP handle uncertainties in data compared to conventional machine learning algorithms?

(8×1=8 weightage)





Part B (Short Essay/Problems)

Answer any **six** questions.

Weight 2 each.

11. Discuss the concept of overfitting in neural networks. What are some techniques to prevent overfitting?
12. Describe the McCulloch and Pitts neuron model and explain its significance in the development of artificial neural networks.
13. Describe the structure of a Hamming Neural Network. What are the key components and their roles in processing input patterns?
14. Compare and contrast SVMs with traditional neural networks. Highlight their respective strengths and weaknesses in handling classification tasks, particularly in scenarios with high-dimensional data or limited training samples.
15. Define bitwise operators and explain their relevance in genetic algorithm encoding schemes.
16. Illustrate the application of fuzzy arithmetic in a decision-making scenario. How does fuzzy arithmetic help in handling vague or ambiguous data?
17. Analyze the role of defuzzification methods in converting fuzzy outputs into crisp values. Compare centroid, maximum membership, and weighted average defuzzification methods.
18. Define a Fuzzy Neuron and explain how it differs from a traditional neuron in artificial neural networks.

(6×2=12 weightage)

Part C (Essay Type Questions)

Answer any **two** questions.

Weight 5 each.

19. Identify and explain the main challenges and limitations associated with the backpropagation algorithm. Discuss various techniques used to address issues such as local minima, slow convergence, and overfitting in BPNNs.
20. Describe the inheritance operators used in evolutionary algorithms. Compare and contrast uniform and non-uniform inheritance operators with examples.
21. Illustrate the application of fuzzy logic in decision-making processes. Provide a detailed example where fuzzy rule bases and approximate reasoning are used to make decisions under uncertainty.
22. Illustrate the application of Fuzzy ARTMAP in a real-world problem scenario, such as pattern recognition or classification. Provide a detailed example including input data, fuzzy sets, and decision-making process.

(2×5=10 weightage)

