B. TECH. (MINOR) CBCS-2023

B. TECH. (MINOR) Semester-I (Sem-III Level) Artificial Intelligence & Data Science : WINTER: 2025

SUBJECT: SOFT COMPUTING

Day : Tuesday
Date : 23/12/2025

W-29442-2025

Time : 10:00 AM-01:00 PM
Max. Marks : 60

N.B.

1) All questions are **COMPULSORY**.
2) Figures to the **RIGHT** indicate **FULL** marks.
3) Assume suitable data **WHEREVER** necessary.
4) Draw neat diagrams **WHEREVER** necessary.

Q.1 Define Soft Computing and describe its significance in solving complex real-world problems. **(10)**

OR

Q.1 Explain the basic concepts of fuzzy logic, neural networks, and evolutionary algorithms, and discuss their roles in Soft Computing. **(10)**

Q.2 Define a biological neuron and describe how it inspires the design of artificial neurons. **(10)**

OR

Q.2 Illustrate how the McCulloch-Pitts neuron model can be used to implement logical AND and OR functions. **(10)**

Q.3 Define a Self-organizing Feature Map (SOM) and describe its primary function in neural networks. **(10)**

OR

Q.3 Describe the Learning Vector Quantization (LVQ) algorithm and how it refines the classification boundaries in neural networks. **(10)**

Q.4 Explain the concept of genetic evolution and its relevance to genetic algorithms. **(10)**

OR

Q.4 Compare the terminology used in biology with that used in genetic algorithms, such as genes, chromosomes, and crossover. **(10)**

Q.5 Explain the steps involved in the Differential Evolution (DE) algorithm and discuss the role of mutation, crossover, and selection in solving optimization problems. **(10)**

OR

Q.5 Discuss how Ant Colony Optimization (ACO) mimics real ant behavior to solve combinatorial optimization problems. Explain the significance of pheromone trails in guiding the search. **(10)**

Q.6 Define a fuzzy number and explain its significance in fuzzy logic. **(10)**

OR

Q.6 Illustrate the basic operations on fuzzy sets and how they differ from traditional set operations. **(10)**

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