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**BRAINWARE UNIVERSITY****Term End Examination 2024-2025****Programme – B.Tech.(EE)]-2021****Course Name – Soft Computing Techniques****Course Code - OE-EE801A****(Semester VIII)**

Library
Brainware University
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Kolkata, West Bengal-700125

Full Marks : 60**Time : 2:30 Hours**

[The figure in the margin indicates full marks. Candidates are required to give their answers in their own words as far as practicable.]

Group-A**(Multiple Choice Type Question)****1 x 15=15**

1. *Choose the correct alternative from the following :*
 - (i) Choose the method that involves determining the boundaries of fuzzy sets and their standard forms:
 - a) Beta Cuts
 - b) Alpha Cuts
 - c) Fuzzification
 - d) Crispification
 - (ii) Identify the classical logic system that serves as the foundation for fuzzy logic.
 - a) Boolean logic
 - b) Predicate logic
 - c) Modal logic
 - d) Probabilistic logic
 - (iii) Identify the process involved in converting a fuzzy set into a crisp value in fuzzy logic.
 - a) Fuzzification
 - b) Defuzzification
 - c) Membership function
 - d) Implication
 - (iv) Identify the purpose of the implication operator in fuzzy logic.
 - a) It determines the degree to which the antecedent influences the consequent in a fuzzy rule.
 - b) It calculates the intersection of two fuzzy sets.
 - c) It measures the degree of overlap between fuzzy sets.
 - d) It converts a crisp value into a fuzzy set.
 - (v) Choose the algorithm that is commonly used to train ANNs:
 - a) Gradient Boosting
 - b) Backpropagation
 - c) K-means clustering
 - d) Random Forest
 - (vi) Write the function of weights in a perceptron:
 - a) They control the learning rate.
 - b) They determine the slope of the activation function.
 - c) They represent the importance of input features.
 - d) They adjust the decision boundary.
 - (vii) Write the purpose of learning rate in backpropagation:

- a) It determines the size of each weight update during training.
b) It defines the number of layers in the neural network.
c) It specifies the type of activation function used.
d) It determines the number of epochs for training.
- (viii) Choose the correct description of the role of weights in a single layer network:
a) Weights are not used in a single layer network
b) Weights control the flow of information between neurons
c) Weights are fixed and cannot be adjusted
d) Weights are only applicable to deep neural networks
- (ix) Choose the characteristic that distinguishes fuzzy sets from crisp sets.
a) They allow partial membership
b) They have clear-cut boundaries
c) They lack ambiguity
d) They have discrete elements
- (x) Choose the operation that involves finding the complement of a fuzzy set.
a) Union
b) Intersection
c) Complement
d) Cartesian product
- (xi) Choose the cardinality of a fuzzy set with all elements having a membership of 0.5.
a) 0
b) 0.5
c) 1
d) Cannot be determined
- (xii) Identify a real-world application of soft computing:
a) Weather prediction
b) Exact mathematical calculations
c) Sorting numbers in ascending order
d) Fixed-rule automation
- (xiii) Choose the correct option that is NOT a component of a genetic algorithm.
a) Selection
b) Mutation
c) Backpropagation
d) Crossover
- (xiv) Identify the correct stage of a genetic algorithm that involves evaluating the fitness of individuals in the population.
a) Selection
b) Crossover
c) Mutation
d) Initialization
- (xv) Choose the correct option for a high mutation rate in a genetic algorithm:
a) Increases the likelihood of convergence to the optimal solution.
b) Decreases the diversity in the population.
c) Speeds up the convergence of the algorithm.
d) Introduces more randomness in the search process.

Group-B

(Short Answer Type Questions)

3 x 5=15

2. Explain the concept of Self-Organizing Maps (SOMs) and their application in data visualization. Provide a brief example to illustrate their effectiveness. (3)
3. Define fuzzy set with example. (3)
4. Discuss computational intelligence (3)
5. Tabulate the difference between computational intelligence and machine learning. (3)
6. Explain some key components of genetic algorithm. (3)

OR

Explain the necessary steps to implement the genetic algorithm. (3)

Group-C

(Long Answer Type Questions)

5 x 6=30

7. State what are some examples of hard computing techniques commonly used in algorithmic problem-solving? (5)
8. Describe what is the significance of Moore's Law in the history of computing? (5)
9. Explain the role of crossover in exploring solution space. (5)

10. Evaluate concept of Rough set. (5)
 11. Explain about application of Ant Colony Optimization. (5)
 12. Illustrate about swarm intelligence. (5)
- OR**
- Illustrate about benefits of swarm intelligence. (5)

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