

Enrollment No.....



Faculty of Engineering  
End Sem Examination Dec-2023  
IT3EA03 Soft Computing

Programme: B.Tech.

Branch/Specialisation: IT

**Duration: 3 Hrs.****Maximum Marks: 60**

Note: All questions are compulsory. Internal choices, if any, are indicated. Answers of Q.1 (MCQs) should be written in full instead of only a, b, c or d. Assume suitable data if necessary. Notations and symbols have their usual meaning.

- Q.1 i. The system uses precision, symbolic logic reasoning, classical mathematical modelling, and search technologies to work efficiently. **1**  
 (a) Hard computing (b) Soft computing  
 (c) Neural network (d) None of these
- ii. The tool which deals with learning and architecture is: **1**  
 (a) Neural network (b) Fuzzy logic  
 (c) Genetic algorithm (d) All of these
- iii. A neuron with 3 inputs has the weight vector  $[0.2 \ -0.1 \ 0.1]$  and a bias  $\theta = 0.3$ . If the input vector is  $X = [0.2 \ 0.4 \ 0.2]$  then the total input to the neuron and if binary activation function is used then actual output is- **1**  
 (a) 0.20,1 (b) 0.02,0  
 (c) 0.02,1 (d) 0.20,0
- iv. Identify the activation function  $\phi(V) = \frac{1 - \exp(-x)}{1 + \exp(-x)}$  **1**  
 (a) Binary step  
 (b) Bipolar step  
 (c) Binary sigmoidal  
 (d) Bipolar sigmoidal
- v. If two fuzzy sets are defined as  $A = \{(x_1, 0.5), (x_2, 0.7), (x_3, 0)\}$  &  $B = \{(x_1, 0.8), (x_2, 0.2), (x_3, 1)\}$ , the intersection will be- **1**  
 (a)  $A \cap B = \{(x_1, 0.5), (x_2, 0.2), (x_3, 0.1)\}$   
 (b)  $A \cap B = \{(x_1, 0.5), (x_2, 0.2), (x_3, 1)\}$   
 (c)  $A \cap B = \{(x_1, 0.5), (x_2, 0.2), (x_3, 0.2)\}$   
 (d)  $A \cap B = \{(x_1, 0.5), (x_2, 0.2), (x_3, 0)\}$

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- vi. Consider a fuzzy set old as defined below: **1**  
 Old = {(20, 0.1), (30, 0.2), (40, 0.3), (50, 0.6), (60, 0.8), (70, 1), (80, 1)}  
 Then the alpha-cut for alpha = 0.3 for the set old will be-  
 (a) {(40,0.3)}  
 (b) {50, 60, 70, 80}  
 (c) {(20, 0.1), (30, 0.2)}  
 (d) {(20,0), (30, 0), (40, 1), (50,1), (60, 1), (70, 1), (80, 1)}
- vii. False statement about selection pressure is- **1**  
 (a) It is the degree to which better individuals are favoured  
 (b) If its value is too high, GA may converge to local optimal solution  
 (c) If it is too low, the convergence rate will be slow.  
 (d) It calculates the fitness value of string
- viii. Genetic Algorithm are a part of- **1**  
 (a) Evolutionary computing  
 (b) Inspired by Darwin's theory about evolution - "survival of the fittest"  
 (c) Are adaptive heuristic search algorithm based on the evolutionary ideas of natural selection and genetics  
 (d) All of these
- ix. In Genetic-Nuero hybrid system, GA can be used for \_\_\_\_\_. **1**  
 (a) Network Topology selection  
 (b) Finding optimal weights  
 (c) Training the network  
 (d) All of these
- x. The hybrid system can be of type- **1**  
 (a) Sequential (b) Auxiliary  
 (c) Embedded (d) Parallel
- Q.2 i. Define soft computing. **2**  
 ii. Explain any three characteristics of soft computing. **3**  
 iii. State any five applications of soft computing in detail. **5**  
 OR iv. Differentiate soft and hard computing under at list five points. **5**
- Q.3 i. Draw architecture of BNN and compare it with ANN. **4**  
 ii. Implement AND gate using perceptron network. **6**  
 OR iii. Explain the training algorithm of back propagation network. **6**

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- Q.4 Attempt any two: **5**  
 i. Explain fuzzy inference system with each step-in detail. **5**  
 ii. What is membership function? What are its different types? **5**  
 iii. Explain any three defuzzification techniques, with examples. **5**
- Q.5 i. Briefly explain types of encoding methods. **4**  
 ii. Explain types of crossover methods with example. **6**  
 OR iii. Explain the operators of genetic algorithms, with examples. **6**
- Q.6 Attempt any two:  
 i. Explain the working of fuzzy logic controlled genetic algorithm. **5**  
 ii. What is hybrid system? How methods can be hybrid together? **5**  
 iii. Explain the working of genetic algorithm based backpropagation network. **5**

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