

Enrollment No.....



Faculty of Engineering  
End Sem (Even) Examination May-2022  
CS3EA03 Soft Computing  
Programme: B.Tech. Branch/Specialisation: CSE

**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.

- Q.1 i. Who initiated idea of soft computing? **1**  
 (a) Charles Darwin (b) Rich and Berg  
 (c) Mc Culloch (d) Lofti A Zadeh
- ii. What's the main point of difference between human & machine intelligence? **1**  
 (a) Humans have emotions  
 (b) Humans have more IQ & intellect  
 (c) Humans perceive everything as a pattern while machine perceive it merely as data  
 (d) Humans have sense organs
- iii. What is the feature of ANNs due to which they can deal with noisy, fuzzy, inconsistent data? **1**  
 (a) Associative Nature of Networks  
 (b) Distributive Nature of Networks  
 (c) Both (a) and (b)  
 (d) None of these
- iv. Desired output is given in: **1**  
 (a) Supervised Learning (b) Unsupervised Learning  
 (c) Reinforcement Learning (d) All of these
- v. Each element of X is mapped to a value between 0 and 1. It is called \_\_\_\_\_. **1**  
 (a) Membership value (b) Degree of membership  
 (c) Membership number (d) Both (a) and (b)
- vi. The word "Very" is related to: **1**  
 (a) Predicate (b) Predicate modifier  
 (c) Predicate qualifier (d) Predicate quantifier

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[2]

- vii. Genetic algorithms are example of- **1**  
 (a) Heuristic (b) Evolutionary algorithm  
 (c) ACO (d) PSO
- viii. Fitness function should be- **1**  
 (a) Maximum (b) Minimum  
 (c) Intermediate (d) None of these
- ix. \_\_\_\_\_ deals with uncertainty problems with its own merits and demerits. **1**  
 (a) Neuro-Fuzzy (b) Neuro-Genetic  
 (c) Fuzzy-Genetic (d) None of these
- x. \_\_\_\_\_ use to determine the weights of a multilayer feedforward network with backpropagation learning. **1**  
 (a) Neuro -Fuzzy (b) Neuro-Genetic  
 (c) Fuzzy -Genetic (d) Crisp-Fuzzy
- Q.2 i. Define soft computing with example. **2**  
 ii. Give the difference between soft computing and hard computing. **3**  
 iii. Explain perceptron network? Also write its learning algorithm. **5**
- OR iv. Implement AND function using McCulloch-Pitts Neuron. **5**  
 (Take binary data).
- Q.3 i. What is supervised learning? How is it different from unsupervised learning? **2**  
 ii. State the characteristics of error back propagation network. **3**  
 iii. Design a Hebb Network to implement logical AND function. **5**  
 (Use bipolar inputs and targets).
- OR iv. Why is BAM required? Draw and explain the BAM architecture. **5**
- Q.4 i. Define characteristic function and membership function with proper equation. **2**  
 ii. Explain fuzzy inference system. **3**  
 iii. Consider two given fuzzy sets: **5**  
 $A = \{0.2, 0.3, 0.4, 0.5\}$   
 $B = \{0.1, 0.2, 0.2, 1\}$   
 Perform Union, Algebraic Sum, Algebraic Product, Bounded Sum and Bounded Difference over fuzzy set A and B.

[3]

- OR iv. Explain cartesian product, classical relation, relation matrix, coordinate diagram and mapping representation with a suitable example. **5**
- Q.5 i. Explain basic GA structure. **4**  
 ii. List and explain mutation operators in genetic algorithm. **6**
- OR iii. Explain travelling salesman problem using genetic algorithm. **6**
- Q.6 Write short note on any two:  
 i. Neuro fuzzy hybrid system **5**  
 ii. Neuro genetic hybrid system **5**  
 iii. Fuzzy genetic hybrid system **5**

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## Marking Scheme

### CS3EA03 Soft Computing

Q.1	i.	Who initiated idea of soft computing? (d) Lofti A Zadeh	1
	ii.	What's the main point of difference between human & machine intelligence? (c) Humans perceive everything as a pattern while machine perceive it merely as data	1
	iii.	What is the feature of ANNs due to which they can deal with noisy, fuzzy, inconsistent data? (c) Both (a) and (b)	1
	iv.	Desired output is given in: (a) Supervised Learning	1
	v.	Each element of X is mapped to a value between 0 and 1. It is called _____. (d) Both (a) and (b)	1
	vi.	The word "Very" is related to: (b) Predicate modifier	1
	vii.	Genetic algorithms are example of- (b) Evolutionary algorithm	1
	viii.	Fitness function should be- (a) Maximum	1
	ix.	_____ deals with uncertainty problems with its own merits and demerits. (a) Neuro-Fuzzy	1
	x.	_____ use to determine the weights of a multilayer feedforward network with backpropagation learning. (b) Neuro-Genetic	1
Q.2	i.	Definition soft computing Example	1 mark 1 mark
	ii.	Difference between soft computing and hard computing 1 mark for each point	3 (1 mark * 3)
	iii.	Perceptron network Diagram Its learning algorithm	1 mark 1 mark 3 marks
	OR iv.	Implement AND function using McCulloch-Pitts Neuron. For table For the steps of numerical	5 1 mark 4 marks

Q.3	i.	Supervised learning Different from unsupervised learning	1 mark 1 mark	2
	ii.	Characteristics of error back propagation network. 1 mark for each point	(1 mark * 3)	3
	iii.	Design a Hebb Network to implement logical AND function For table For the steps of numerical	1 mark 4 marks	5
	OR iv.	Reason of BAM requirement Diagram Explanation	1 mark 2 marks 2 marks	5
Q.4	i.	Characteristic function Membership function	1 mark 1 mark	2
	ii.	Fuzzy inference system Diagram	1.5 marks 1.5 marks	3
	iii.	Perform Union, Algebraic Sum, Algebraic Product, Bounded Sum and Bounded Difference over fuzzy set A and B. As per the explanation	5	5
	OR iv.	Explain cartesian product, classical relation, relation matrix, coordinate diagram and mapping representation with a suitable example. 5 marks for 5 terms used in relation	5	5
Q.5	i.	Basic GA structure Structure Description	2 marks 2 marks	4
	ii.	List of mutation operators Five types of mutation operators	1 mark 5 marks	6
	OR iii.	Travelling salesman problem definition Number of step for genetic algorithm.	1 mark 5 marks	6
	Q.6	Write short note on any two:		
	i.	Neuro fuzzy hybrid system Definition Diagram Description	1 mark 2 marks 2 marks	5
	ii.	Neuro genetic hybrid system Definition Diagram	1 mark 2 marks	5

	Description	2 marks	
iii.	Fuzzy genetic hybrid system		<b>5</b>
	Definition	1 mark	
	Diagram	2 marks	
	Description	2 marks	

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