

Enrollment No.....



Faculty of Engineering  
End Sem (Odd) Examination Dec-2019  
CS3EA03 / IT3EA03 Soft Computing

Programme: B.Tech.

Branch/Specialisation: CS / 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.

- Q.1 i. Core of soft computing is 1  
 (a) Fuzzy networks and artificial intelligence  
 (b) Fuzzy computing, neural computing, genetic algorithms  
 (c) Artificial intelligence and neural science  
 (d) Neural science and genetic science
- ii. Any soft-computing methodology is characterized with 1  
 (a) Precise solutions.  
 (b) Control actions are unambiguous and accurate.  
 (c) Control action is formally defined.  
 (d) Algorithm which can easily adapt with the change of dynamic environment.
- iii. Which of the following is true? 1  
 I. On average, neural networks have higher computational rates than conventional computers.  
 II. Neural networks learn by example.  
 III. Neural networks mimic the way the human brain works.  
 (a) All of these are true  
 (b) II and III are true  
 (c) I, II and III are true  
 (d) None of these
- iv. In artificial neural network interconnected processing elements are called 1  
 (a) Weights (b) Nodes or neurons  
 (c) Axons (d) Soma

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- v. The truth values of traditional set theory is \_\_\_\_\_ and that of fuzzy set is \_\_\_\_\_ **1**  
 (a) Either 0 or 1, between 0 & 1  
 (b) Between 0 & 1, either 0 or 1  
 (c) Between 0 & 1, between 0 & 1  
 (d) Either 0 or 1, either 0 or 1
- vi. If A and B are two fuzzy sets with membership functions  $\mu_A(x) = \{0.2, 0.5, 0.6, 0.1, 0.9\}$   $\mu_B(x) = \{0.1, 0.5, 0.2, 0.7, 0.8\}$  Then the value of  $\mu_{A \cap B}$  will be **1**  
 (a)  $\{0.2, 0.5, 0.6, 0.7, 0.9\}$  (b)  $\{0.2, 0.5, 0.2, 0.1, 0.8\}$   
 (c)  $\{0.1, 0.5, 0.2, 0.1, 0.8\}$  (d)  $\{0.1, 0.5, 0.6, 0.1, 0.8\}$
- vii. Genetic algorithm **1**  
 (a) Are a part of 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
- viii. Which of the following operator is not found in Genetic Algorithms? **1**  
 (a) Crossover (b) Multiplication  
 (c) Reproduction (d) Selection
- ix. Which of the following cannot be stated using fuzzy logic? **1**  
 (a) Color of an apple (b) Height of a person  
 (c) Date of birth of a student (d) Speed of a car
- x. Both fuzzy logic and artificial neural network are soft computing techniques because **1**  
 (a) Both gives precise and accurate results.  
 (b) Artificial neural network gives accurate result, but fuzzy logic does not.  
 (c) In each, no precise mathematical model of the problem is required.  
 (d) Fuzzy gives exact result but artificial neural network does not.
- Q.2 i. What is soft computing? Write any two applications of soft computing. **4**

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- ii. Distinguish between soft computing and hard computing. **6**  
 OR iii. Explain any three soft computing techniques in detail. **6**
- Q.3 i. Distinguish between artificial neuron & biological neuron. **4**  
 ii. Explain types of learning in neural network. **6**  
 OR iii. Explain various types of neural network architectures. **6**
- Q.4 i. Explain membership function in fuzzy logic. **3**  
 ii. What is fuzzy set theory? Explain any three fuzzy set operations with example. **7**  
 OR iii. Let  $X = \{x_1, x_2\}$ ,  $Y = \{y_1, y_2\}$ , and  $Z = \{z_1, z_2, z_3\}$ . The relation R and S are given below: **7**  
 $R(X, Y) = \begin{bmatrix} 0.7 & 0.5 \\ 0.8 & 0.4 \end{bmatrix}$  and  $S(Y, Z) = \begin{bmatrix} 0.9 & 0.6 & 0.2 \\ 0.1 & 0.7 & 0.5 \end{bmatrix}$   
 Determine RoS using max- min composition.
- Q.5 i. Discuss any two applications of genetic algorithm. **4**  
 ii. Explain genetic algorithm. Also draw and explain the flow chart of genetic algorithm. **6**  
 OR iii. List and explain any three crossover operator in genetic algorithm with suitable example. **6**
- Q.6 i. What do you mean by hybrid systems? **2**  
 ii. Explain architecture of fuzzy backpropagation network. **8**  
 OR iii. Explain genetic algorithm-based backpropagation network. **8**

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**Marking Scheme**  
**CS3EA03 / IT3EA03 Soft Computing**

Q.1	i.	Core of soft computing is	1
		(b) Fuzzy computing, neural computing, genetic algorithms	
	ii.	Any soft-computing methodology is characterized with	1
		(d) Algorithm which can easily adapt with the change of dynamic environment.	
	iii.	Which of the following is true?	1
		(a) All of these are true	
	iv.	In artificial neural network interconnected processing elements are called	1
		(b) Nodes or neurons	
	v.	The truth values of traditional set theory is _____ and that of fuzzy set is _____	1
		(a) Either 0 or 1, between 0 & 1	
	vi.	If A and B are two fuzzy sets with membership functions $\mu_A(x) = \{0.2, 0.5, 0.6, 0.1, 0.9\}$ $\mu_B(x) = \{0.1, 0.5, 0.2, 0.7, 0.8\}$ Then the value of $\mu_{A \cap B}$ will be	1
		(c) $\{0.1, 0.5, 0.2, 0.1, 0.8\}$	
	vii.	Genetic algorithm	1
		(d) All of these	
	viii.	Which of the following operator is not found in Genetic Algorithms?	1
		(b) Multiplication	
	ix.	Which of the following cannot be stated using fuzzy logic?	1
		(c) Date of birth of a student	
	x.	Both fuzzy logic and artificial neural network are soft computing techniques because	1
		(c) In each, no precise mathematical model of the problem is required.	
Q.2	i.	Definition soft computing	2 marks
		Any two applications of soft computing	2 marks
	ii.	Distinguish between soft computing and hard computing	6
		Any six differences 1 mark for each	(1 mark * 6)

OR	iii.	Any three soft computing techniques	6
		2 marks for each technique	(2 marks * 3)
Q.3	i.	Distinguish between artificial neuron & biological neuron	4
		Any four differences 1 mark for each	(1 mark * 4)
	ii.	Types of learning in neural network	6
		Any three types 2 marks for each	(2 marks * 3)
OR	iii.	Types of neural network architectures.	6
		Any three types of architecture 2 marks for each	(2 marks * 3)
Q.4	i.	Membership function in fuzzy logic.	3
	ii.	Definition fuzzy set theory	7
		Any three fuzzy set operations with example	6 marks
		2 marks for each operation (2 marks * 3)	
OR	iii.	Determine RoS using max- min composition.	7
		Formula	2 marks
		Correct solution	5 marks
Q.5	i.	Any two applications of genetic algorithm.	4
		2 marks for each application	(2 marks * 2)
	ii.	Definition genetic algorithm	6
		Flow chart of genetic algorithm	2 marks
		Explanation	2 marks
OR	iii.	Any three crossover operator in genetic algorithm with example	6
		2 marks for each operator	(2 marks * 3)
Q.6	i.	Definition hybrid systems	2
	ii.	Architecture of fuzzy backpropagation network.	8
		Diagram	2 marks
		Explanation	6 marks
OR	iii.	Genetic algorithm-based backpropagation network	8
		Definition	2 marks
		Explanation	6 marks

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