Total No. of Questions: 6 *Total No. of Printed Pages:3*

Enrollment No.....

Faculty of Engineering

End Sem (Odd) Examination Dec-2022

CS3EA03 / IT3EA03 Soft Computing

Programme: B.Tech. Branch/Specialisation: CSE/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. A model for imprecise, partial truth, uncertainty is- **1**

(a) Hard Computing (b) Mobile Computing

(c) Soft Computing (d) Cloud Computing

ii. The process of categorising and classification is carried out by- **1**

(a) Neural Networks (b) Genetic Algorithm

(c) Both (a) and (b) (d) None of these

iii. If the input vector to a neuron Y is X=[0.8, 0.6, 0.4] and weight vector **1**
W = [0.1,0.3, -0.2], the value of net input to Y will be -

(a) 0.53 (b) 0.18 (c) 0.89 (d) 1

iv. The BNN does not content- **1**

(a) Soma (b) Axon (c) Dendrites (d) Weights

v. If one fuzzy set defined as A1 = {(x1, 0.1),(x2, 0.5),(x3, 0.6),(x4, 0.8)}, if alpha cut is defined at 0.3 then the correct defuzzified output is- **1**

(a) {x2,x3,x4} (b) {x1,x2,x3,x4}

(c) {x1,x4} (d) {x1,x3,x4}

vi. The set of all points x in X such that {(x| μA (x)>0}- **1**

(a) Core (A) (b) Support (A)

(c) Boundary (A) (d) None of these

vii. Which of the following is not an application area of Genetic Algorithm? **1**

(a) Optimization

(b) Routing Problems

(c) Timetabling/ Scheduling Problem

(d) Problems dealing with uncertainty

P.T.O.

viii. Mutation can perform- **1**
(a) Inversion (b) Bit flip (c) Deletion (d) All of these

ix. _____ System deals with learning in uncertain situation. **1**
(a) Neuro-Fuzzy (b) Neuro-Genetic
(c) Fuzzy-Genetic (d) None of these

x. A hybrid system mimic- **1**
(a) Human decision-making process
(b) Human reasoning
(c) Critical thinking and expert tasks
(d) All of these

Q.2 i. Define computing. Write any four characteristics of soft computing systems? **4**

ii. Differentiate soft and hard computing under six points. **6**

OR iii. Explain any three applications of soft computing systems. Also explain how neural networks, fuzzy logic and genetic algorithm will be used in example application. **6**

Q.3 i. Explain biological neural network with diagrams. Compare it with artificial neural network **3**

ii. Implement AND gate with perceptron network upto 3 epochs. Initialize weights and bias to 0, learning rate to 1 and consider binary activation function. **7**

OR iii. Explain the learning process of Back Propagation Network. **7**

Q.4 i. If two fuzzy sets are defined as A = {(x1,0.5), (x2,0.7), (x3,0)} & B = {(x1,0.8), (x2,0.2), (x3,1)} Calculate the following **4**
(a) $A \cap B$
(b) $A \cup B$
(c) $A \times B$
(d) A^C

ii. Explain the working of fuzzy inference systems. State any 3 methods of defuzzification. **6**

OR iii. Apply generalized modus ponens (GMP) to deduce "Rotation if quite slow." Given- **6**
(a) It temperature is high then rotation is slow
(b) Temperature is very high.

Q.5 i. Discuss any four applications of genetic algorithms. **4**

ii. How does a genetic algorithm work? Explain all operators in detail. **6**

OR iii. Explain any three types of selection/ reproduction operator. **6**

Q.6 Attempt any two:

i. What is the need for a hybrid system in soft computing? How different techniques can be hybrid? **5**

ii. Explain architecture of fuzzy backpropagation network **5**

iii. Explain the working of genetic based neural systems. **5**

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Marking Scheme
IT3EA03 Soft Computing

Q.1	i)	A model for imprecise, partial truth, uncertainty is c) Soft Computing	**1**
	ii)	The process of categorising and classification is carried out by a) Neural Networks	**1**
	iii)	If the input vector to a neuron Y is X=[0.8, 0.6, 0.4] and weight vector W = [0.1,0.3, -0.2], the value of net input to Y will be b) 0.18	**1**
	iv)	The BNN does not contents d) Weights	**1**
	v)	If one fuzzy set defined as A1 = {(x1, 0.1),(x2, 0.5),(x3, 0.6),(x4, 0.8)}, if alpha cut is defined at 0.3 then the correct defuzzified output is a) {x2,x3,x4}	**1**
	vi)	The set of all points x in X such that {(x| μA (x)>0 } b) Support (A)	**1**
	vii)	Which of the following is not an application area of Genetic Algorithm? d) Problems dealing with uncertainty	**1**
	viii)	Mutation can perform …..... d) All of these	**1**
	ix)	…..... System deals with learning in uncertain situation a) Neuro-Fuzzy	**1**
	x)	A hybrid system mimic a) All of these	**1**
Q.2	i.	Define Computing. Write any 4 characteristics of soft computing systems? (0.5 for each)	**2** **2**
	ii.	Differentiate soft and hard computing under 6 points. 1 mark for each point	**6**
OR	iii.	Explain any 3 applications of soft computing systems. Also explain how neural networks, fuzzy logic and genetic algorithms will be used in example application.	**3** **3**
Q.3	i.	Explain Biological neural network with diagrams. Compare it with artificial neural network	**1.5** **1.5**
	ii.	Implement AND gate with perceptron network upto 3 epochs. Initialize weights and bias to 0, learning rate to 1 and consider binary activation function. 3 marks for 1st epoch 2 marks for 2nd and 3rd epoch	**7**
OR	iii.	Explain the learning process of Back Propagation Network. Diagram Introduction Algorithm	**1** **2** **3**
Q.4	i.	If two fuzzy sets are defined as A = {(x1,0.5),(x2,0.7),(x3,0)} & B = {(x1,0.8),(x2,0.2),(x3,1)} Calculate the following (a) $\mathbf{A} \cap \mathbf{B}$ (b) $\mathbf{A} \cap \mathbf{B}$ (c) A X B (d) A^C	**1** **1** **1** **1**
	ii.	Explain the working of fuzzy inference systems. State any 3 methods of defuzzification.	**3** **3**
OR	iii.	Apply generalized modus ponens (GMP) to deduce "Rotation if quite slow." Given- (i) It temperature is high then rotation is slow (ii)Temperature is very high. Deduction	**2** **2** **2**
Q.5	i.	Discuss any 4 applications of genetic algorithms. 1 for each	**4**
	ii.	How does a genetic algorithm work? Explain all operators in detail.	**2** **4**
OR	iii.	Explain any 3 types of selection/ reproduction operator. 2 for each	**6**
Q.6		Attempt any two:	
	i.	What is the need for a hybrid system in soft computing? How different techniques can be hybrid?	**3** **3**
	ii.	Explain architecture of fuzzy backpropagation network Diagram Explanation	**2** **3**
	iii.	Explain the working of genetic based neural systems. Diagram Explanation	**2** **3**

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