

Enrollment No.....



Faculty of Engineering
End Sem Examination May-2024
CS3EA11 Soft Computing

Programme: B.Tech.

Branch/Specialisation: CSE All

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. Who initiated the idea of soft computing? 1
 (a) Charles Darwin (b) Lofti A Zadeh
 (c) Rechenberg (d) Mc_Culloch
- ii. A binary sigmoid function has a range of _____. 1
 (a) (-1, +1) (b) (0, -1) (c) (0,1) (d) (-1,0)
- iii. Least squares estimation minimizes- 1
 (a) Summation of squares of errors
 (b) Summation of errors
 (c) Summation of absolute values of errors
 (d) All of the above
- iv. What kind of learning is involved in pattern clustering task? 1
 (a) Supervised (b) Unsupervised
 (c) Learning with critic (d) None of these
- v. _____ is the way to represent uncertainty. 1
 (a) Fuzzy logic (b) Probability
 (c) Entropy (d) All of these
- vi. Fuzzy logic is usually represented as _____. 1
 (a) IF-THEN-ELSE rules (b) IF-THEN rules
 (c) Both (a) and (b) (d) None of these
- vii. GA techniques are inspired by _____ biology. 1
 (a) Evolutionary (b) Cytology
 (c) Anatomy (d) Ecology
- viii. Producing two new offspring from two parent string by copying 1 selected bits from each parent is called- 1
 (a) Mutation (b) Inheritance (c) Crossover (d) None of these

[2]

- ix. The difference between crisp set that is classical and fuzzy sets is established by introducing a _____ function. **1**
 (a) Membership (b) Tree (c) Real (d) Point
- x. What is true regarding backpropagation rule? **1**
 (a) It is also called generalized delta rule
 (b) Error in output is propagated backwards only to determine weight updates
 (c) There is no feedback of signal at any stage
 (d) All of these
- Q.2 i. What is the importance of activation function in neural network? **2**
 ii. Differentiate the features of soft computing and hard computing. **3**
 iii. Using McCulloch-Pitts neuron model, design a neural network for 2-input XOR functions. **5**
- OR iv. Determine the weights of a single layer perceptron for implementing the AND function. Consider the inputs and targets to be bipolar and $\alpha=1$. **5**
- Q.3 i. Distinguish between supervised learning and unsupervised learning algorithm. **2**
 ii. Explain characteristic features, limitations and applications of associative memory. **8**
- OR iii. Explain the working of back propagation neural network with neat architecture and flowchart. **8**
- Q.4 i. What is cardinality of a Fuzzy set? Whether a power set can be formed for a fuzzy set? **3**
 ii. Discuss different defuzzification methods. **7**
- OR iii. Explain max-min composition and max-product composition with example. **7**
- Q.5 i. What are the advantages of GA over conventional algorithms? **4**
 ii. Explain the major components of genetic algorithm with flow chart. **6**
- OR iii. With an example for each bring out the significance of the following as referred to Genetic Algorithm: **6**
 (a) Fitness function (b) Reproduction
 (c) Roulette wheel selection (d) Cross over
 (e) Mutation operator (f) Bitwise operators

[3]

- Q.6 Attempt any two: **5**
- i. Discuss the application areas of Neuro-fuzzy hybrid systems. **5**
 ii. Discuss components and working process of a Neuro-Genetic systems. **5**
 iii. Explain fuzzy-genetic hybrid system. **5**

Marking Scheme

CS3EA11 (T) Soft Computing

Q.1	i.	B	1
	ii.	C	1
	iii.	A	1
	iv.	B	1
	v.	D	1
	vi.	B	1
	vii.	A	1
	viii.	C	1
	xi.	A	1
	x.	D	1
Q.2	i.	What is the importance of activation function in neural network? (2 mark)	2
	ii.	Differentiate the features of soft computing and hard computing? (3 mark for 3 different features)	3
	iii.	Using McCulloch-Pitts neuron model, design a neural network for 2-input XOR functions. (1 mark for table and 4 marks for equations)	5
OR	iv.	Determine the weights of a single layer perceptron for implementing the AND function. Consider the inputs and targets to be bipolar and $\alpha=1$. (1 mark for table and 4 marks for equations)	5
Q.3	i.	Distinguish between supervised learning and unsupervised learning algorithm. (2 mark for 2 difference)	2
	ii.	Explain characteristic features, limitations and applications of associative memory. (2 marks for characteristics, 2 mark for limitations and 4 mark for applications)	8
OR	iii.	Explain the working of back propagation neural network with neat architecture and flowchart. (1 mark for definition, 2 mark for diagram, 2.5 marks for learning algorithm and 2.5 for training algorithm.	8
Q.4	i.	What is cardinality of a Fuzzy set? Whether a power set can be formed for a fuzzy set? (1 mark for definition, 1 mark for example and 1 mark for power set)	3
	ii.	Discuss different Defuzzification methods? (2 marks for name of techniques and 5 mark for explanation of each technique).	7
OR	iii.	Explain Max-min Composition and Max-product composition with example? (3.5 for Max-min Composition and 3.5 for Max-product composition)	7
Q.5	i.	What are the advantages of GA over conventional algorithms? (4 marks for 4 advantages)	4
	ii.	Explain the major components of genetic algorithm with flow chart. (2 mark for diagram and 4 marks for explanation)	6
OR	iii.	With an example for each bring out the significance of the following as referred to Genetic Algorithm: (i) Fitness function, (ii) Reproduction, (iii) Roulette wheel selection, (iv) Cross Over, (v) Mutation Operator (vi) Bitwise operators (1 mark for each)	6
Q.6		Attempt any two:	
	i.	Discuss the application areas of Neuro-fuzzy hybrid systems (5 mark for 5 application)	5
	ii.	Discuss components and working process of a Neuro-Genetic systems (2 mark for diagram and 3 marks for explanation)	5
	iii.	Explain fuzzy-genetic hybrid system? (2 mark for diagram and 3 mark for explanation)	5
