

Total No. of Questions: 6

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Enrollment No.....



Faculty of Engineering
End Sem (Odd) Examination Dec-2018
OE00002 Neural Networks & Fuzzy Systems

Programme: B.Tech.

Branch/Specialisation: 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.

- Q.1
- i. What is an activation value? 1
(a) Weighted sum of inputs (b) Threshold value
(c) Main input to neuron (d) None of these
 - ii. Widrow & Hoff learning law is special case of? 1
(a) Hebb's learning law (b) Perceptron learning law
(c) Delta learning law (d) None of these
 - iii. How can learning process be stopped in backpropagation rule? 1
(a) There is convergence involved
(b) No heuristic criteria exist
(c) On basis of average gradient value
(d) None of these
 - iv. Who invented perceptron neural networks? 1
(a) McCulloch-pitts (b) Widrow
(c) Minsky & papert (d) Rosenblatt
 - v. What kind of dynamics leads to learning laws? 1
(a) Synaptic (b) Neural (c) Activation (d) Both (a) and (b)
 - vi. What is asynchronous update in Hopfield model? 1
(a) All units are updated simultaneously
(b) A unit is selected at random and its new state is computed
(c) A predefined unit is selected and its new state is computed
(d) None of these
 - vii. Fuzzy logic is a form of 1
(a) Two-valued logic (b) Crisp set logic
(c) Many-valued logic (d) Binary set logic

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- viii. 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
- ix. Fuzzification is a process of **1**
(a) Making a fuzzy quantity crisp
(b) Making a crisp quantity fuzzy
(c) Converting a fuzzy quantity into a membership function
(d) Converting a membership function into a fuzzy quantity
- x. Which one of the following is not a feature of a membership function: **1**
(a) Core (b) Support (c) Boundaries (d) Normal
- Q.2 i. Briefly describe Delta learning rule. **2**
ii. Elucidate various neural network architectures. **3**
iii. Explain activation function, its utility, features and types in the model of neural networks. **5**
- OR iv. Explain the McCulloch-Pitt's model in details. **5**
- Q.3 i. Differentiate Perceptron model & McCulloch-Pitt's model. **2**
ii. Explain Back Propagation Algorithm in details. **8**
- OR iii. Explain Perception convergence theorem and algorithm. Also explain LMS learning algorithm. **8**
- Q.4 i. How do the learning algorithms differ in case of Recurrent Neural networks as compared to Feed-forward neural networks? **3**
ii. Explain topology and learning algorithm of Hopfield network. How is it useful in pattern recognition? **7**
- OR iii. Write a short note on applications of recurrent neural networks in the fields of communication and robotics. **7**
- Q.5 i. Differentiate Fuzzy sets and Crisp sets by giving suitable real life examples. **4**

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- ii. Explain Union, Intersection, Complement & Containment operators for Fuzzy relations. How do they differ as compared to Crisp relations? **6**
- OR iii. Write down different ways to develop the membership values that characterize a relation. Explain Cosine Amplitude and Max-Min methods in details. **6**
- Q.6 Attempt any two:
- i. Draw block diagram of first-generation (non-adaptive) simple fuzzy controllers. Also write down the steps in designing a simple fuzzy control system. **5**
- ii. Discuss features and properties of membership functions. **5**
- iii. Explain the terms Fuzzification and Defuzzification by giving suitable examples. **5**

Marking Scheme

OE00002 Neural Networks & Fuzzy Systems

Q.1	i.	What is an activation value? (a) Weighted sum of inputs	1
	ii.	Widrow & Hoff learning law is special case of? (c) Delta learning law	1
	iii.	How can learning process be stopped in back propagation rule? (c) on basis of average gradient value	1
	iv.	Who invented perceptron neural networks? (d) Rosenblatt	1
	v.	What kind of dynamics leads to learning laws? (a) synaptic	1
	vi.	What is asynchronous update in Hopfield model? (b) a unit is selected at random and its new state is computed	1
	vii.	Fuzzy logic is a form of (c) Many-valued logic	1
	viii.	The truth values of traditional set theory is _____ and that of fuzzy set is _____ (a) Either 0 or 1, between 0 & 1	1
	ix.	Fuzzification is a process of (d) Converting a membership function into a fuzzy quantity	1
	x.	Which one of the following is not a feature of a membership function: (d) Normal	1
Q.2	i.	Delta learning rule.	2
	ii.	Neural network architectures. Single Layer Feedforward Networks 1 mark Multi Layer Feedforward Networks 1 mark Recurrent Networks 1 mark	3
	iii.	Definition of activation function 1 mark Utility of activation function 1 mark Features of activation function 1 mark Types of activation function: Threshold 1 mark Sigmoid 1 mark	5

OR	iv.	McCulloh-Pitt's model in details. Diagram 2 marks Explanation of Diagram 3 marks	5
Q.3	i.	Differentiate Perceptron model & McCulloh-Pitt's model. Perceptron model 1 mark McCulloh-Pitt's model 1 mark	2
	ii.	Explain Back Propagation Algorithm in details. Explanation of purpose and diagram 2 marks Mathematical Derivation 4 marks Summary 2 marks	8
OR	iii.	Explain Perception convergence theorem and algorithm. Also explain LMS learning algorithm. Theorem 2 marks Algorithm 2 marks LMS learning algorithm 4 marks	8
Q.4	i.	How do the learning algorithms differ in case of Recurrent Neural networks as compared to Feed-forward neural networks?	3
	ii.	Explain topology and learning algorithm of Hopfield network. How is it useful in pattern recognition? Topology 2 marks Mathematical Derivation 4 marks Usefulness in pattern recognition 1 mark	7
OR	iii.	Write a short note on applications of recurrent neural networks in the fields of communication and robotics. Applications in communication 3 marks Applications in robotics 4 marks	7
Q.5	i.	Differentiate Fuzzy sets and Crisp sets by giving suitable real life examples. Fuzzy sets 2 marks Crisp sets 2 marks	4

ii. Explain Union, Intersection, Complement & Containment operators for Fuzzy relations. How do they differ as compared to Crisp relations? **6**

Union operator 1 mark

Intersection operator 1 mark

Complement operator 1 mark

Containment operator 1 mark

Difference 2 marks

OR iii. Write down different ways to develop the membership values that characterize a relation. Explain Cosine Amplitude and Max-Min methods in details. **6**

Different ways 2 marks

Cosine Amplitude method 2 marks

Max-Min method 2 marks

Q.6 Attempt any two:

i. Draw block diagram of first-generation (non-adaptive) simple fuzzy controllers. Also write down the steps in designing a simple fuzzy control system. **5**

Block Diagram 3 marks

Design steps 2 marks

ii. Discuss features and properties of membership functions. **5**

Features 2 marks

Properties 3 marks

iii. Explain the terms Fuzzification and Defuzzification by giving suitable examples. **5**

Fuzzification 2.5 marks

Defuzzification 2.5 marks
