

D-1141
M.Sc. (I.T.) (4th semester) New
EXAMINATION, JUNE, 2020
Soft Computing
M.Sc.(IT) (402)

Time: Three Hours]

[Max. Marks : 100

[Min. Marks : 40

Note: Attempt all sections as directed.

Section A
(Objective Type Questions)

Note: Attempt all questions.

each 1 mark.

Q1. Each connection link in ANN is associated with _____ which has information about the input signal.

- a. Neurons
- b. weights
- c. bias
- d. activation function

Q2. What is adaline in neural networks?

- a. Adaptive linear element
- b. Automatic linear element
- c. Adaptive line element
- d. None of above

Q3. Error correction learning is type of?

- a. Supervised learning
- b. Unsupervised learning
- c. Can be supervised or unsupervised.
- d. None of above

Q4. Fuzzy logic is form of

- a. Two value Logic
- b. Crisp Set Logic
- c. Many Value Logic
- d. Binary Set Logic

Q5. Fuzzy Set theory defines fuzzy operators. Choose the fuzzy operators from the following.

- a. AND
- b. OR
- c. NOT
- d. All of the Above

Q6. A perceptron is:

- a. A single layer feed-forward neural network with pre-processing
- b. An auto-associative neural network.
- c. A double layer auto-associative neural network.
- d. A neural network that contains feedback

Q7. The network that involves backward links from output to the input and hidden layers is called as

- a. Perceptrons
- b. Multi layered perceptron
- c. Recurrent neural network
- d. Self organizing maps

Q8. The values of the set membership is represented by _____

- a. Discrete Set
- b. Degree of truth
- c. Probabilities
- d. Both Degree of truth & Probabilities

Q9. A _____ point of a fuzzy set A is a point $x \in X$ at which $\mu_A(x) = 0.5$

- a. Core
- b. Support
- c. Cross Over
- d. α - cut

Q10. What are the following sequence of steps taken in designing a fuzzy logic machine ?

- a. Fuzzification \rightarrow Rule evaluation \rightarrow Defuzzification
- b. Rule evaluation \rightarrow Fuzzification \rightarrow Defuzzification
- c. Rule evaluation \rightarrow Defuzzification \rightarrow Fuzzification
- d. Fuzzification \rightarrow Defuzzification \rightarrow Rule evaluation

Q11. If A and B are two fuzzy sets with membership functions

$$\mu_A(x) = \{0.6, 0.5, 0.1, 0.7, 0.8\}$$

$$\mu_B(x) = \{0.9, 0.2, 0.6, 0.8, 0.5\}$$

Then the value of $\mu(A \cup B)(x)$ will be

- a. $\{0.1, 0.5, 0.4, 0.2, 0.2\}$
- b. $\{0.1, 0.5, 0.4, 0.2, 0.3\}$
- c. $\{0.6, 0.2, 0.1, 0.7, 0.5\}$
- d. $\{0.9, 0.5, 0.6, 0.8, 0.8\}$

Q12. Genetic Algorithms are a part of

- a. Evolutionary Computing
- b. adaptive heuristic search algorithms
- c. inspired by Darwin's theory about evolution - "survival of the fittest"
- d. All of the above

Q13. How the new states are generated in genetic algorithm?

- a. Mutation
- b. Cross-over
- c. Composition
- d. Both Mutation & Cross-over

Q14. Genetic Algorithms are considered pseudo-random because they:

- a. Search the solution space in a random fashion.
- b. Search the solution space using the previous generation as a starting
- c. Have no knowledge of what strains are contained in the next stage
- d. Use random numbers.

Q15. Binary Sigmoid function is

- a. $\frac{1}{1 + e^{-\lambda x}}$
- b. $\frac{1}{2 + e^{-\lambda x}}$
- c. $\frac{1}{1 + e^{-2\lambda x}}$
- d. $\frac{2}{1 + e^{-\lambda x}}$

Q16. Supervised Learning is

- a. learning with the help of examples
- b. learning without teacher
- c. learning with the help of teacher
- d. learning with computers as supervisor

Q17. What is the output of the following code?

A=[0 0 0; 0 9 0; 1 2 3]; xyz[A]

- a. 4
- b. 0
- c. 123
- d. Error

Q18. Which command gives a title to the graph plotted by MATLAB?

- a. plot() generates the title itself
- b. title()
- c. xlabel()
- d. heading()

Q19. Which of the following is the application of Neural Network?

- a. Sales forecasting
- b. Risk Management
- c. Data Validation
- d. All of the above

Q20. Solving a multi-objective optimization problem with Genetic Algorithm always yields

- a. a unique single solution
- b. multiple solutions where all are optimal
- c. a number of Pareto-optima solutions
- d. a single Pareto-optimal solution

Section B

(Very Short Answer Type Questions)

Note: Attempt all questions. Answer using 2-3 sentences. each 2 marks.

- Q1. Define fuzzy set.
- Q2. Define two algebraic methods.
- Q3. Define membership function.
- Q4. Define an artificial neural network.
- Q5. What is weight, bias and learning rate parameter?
- Q6. Write the applications of ANN
- Q7. What is Population in Genetic Algorithm?
- Q8. What is Associative Memory Network?
- Q9. What is MATLAB?
- Q10. Define mutation and its type.

Section C

(Short Answer Type Questions)

Note: Attempt all questions. Answer precisely using < 75 words. each 3 marks.

- Q1. For the two fuzzy sets.

$$A = \left\{ \frac{0.1}{0} + \frac{0.2}{1} + \frac{0.4}{2} + \frac{0.6}{3} + \frac{1}{4} \right\}$$
$$B = \left\{ \frac{1}{0} + \frac{0.5}{1} + \frac{0.7}{2} + \frac{0.3}{3} + \frac{0}{4} \right\}$$

Find the following

a. $\tilde{A} \cup \tilde{B}$ b. $\tilde{A} \cap \tilde{B}$ c. $\tilde{A} \cap \overline{\tilde{B}}$

- Q2. Consider the following two fuzzy relation set and find the MAX- MIN composition.

$$\tilde{R} = \begin{bmatrix} 0.6 & 0.3 \\ 0.2 & 0.9 \end{bmatrix} \quad \tilde{S} = \begin{bmatrix} 0.6 & 0.3 \\ 0.2 & 0.9 \end{bmatrix}$$

- Q3. Briefly explain the ANN learning method.
- Q4. What is Activation function? Explain any two.
- Q5. Write the applications of Genetic Algorithm.
- Q6. Explain different plot method in MATLAB.
- Q7. Explain three cross over method.
- Q8. Explain the types of neural network.
- Q9. Why lambda cut is used in fuzzy relation?
- Q10. Explain the cardinality of fuzzy relation.

Section D

(Long Answer Type Questions)

Note: Attempt all questions. Answer precisely using 150 words. each 6 marks.

Q1. Obtain the output of the neuron Y for the network $[W_1, W_2, W_3] = [0.1, 0.3, -0.2]$ and Input neuron has $[x_1, x_2, x_3] = [0.8, 0.6, 0.4]$ with bias 0.35 using bipolar and sigmoid activation function.

OR

Write the Adaline Algorithm.

Q2. What is Defuzzification? Explain Center of sums, Centroid and Mean – Max methods.

OR.

What is fuzzy Arithmetic? Explain the any four Methods.

Q3. What are the operators in Genetic Algorithm? Explain Selection operators.

OR

How Population can be encoded in Genetic algorithm explain its methods.

Q4. Explain in brief features of MATLAB.

OR

Explain five different basic MATLAB functions with example.

Q5. Explain integration of genetic algorithms with fuzzy logic.

OR

Discuss the integration of genetic algorithms with neural network and its advantages