B.E. Electronics & Communication / Telecommunication Engineering (Model Curriculum)
Semester-VIII

ET805M-I - Introduction of Neural Network and Artificial Intelligence

P. Pages : 3 **GUG/W/24/14360**

Time : Three Hours * 5 8 4 5 * Max. Marks : 80

Notes : 1. All questions carry marks as indicated.
2. Due credit will be given to neatness and adequate dimensions.
3. Assume suitable data wherever necessary.
4. Illustrate your answers wherever necessary with the help of neat sketches.

1. a) Define Fuzzy Logic. Discuss the potential advantages of fuzzy logic based systems over classical approach. **8**

b) Fuzzy sets $A = \left\{\frac{0.7}{1} + \frac{0.5}{2} + \frac{0.1}{3} + \frac{0.6}{4}\right\}$ and $B = \left\{\frac{0.4}{1} + \frac{0.9}{2} + \frac{0.3}{3} + \frac{0.7}{4}\right\}$ **8**

Calculate the following set theoretic operations on fuzzy sets.

i) $A \cup B$ ii) $A \cap B$

iii) $\overline{A}$ iv) $\overline{B}$

v) $A \mid B$

OR

2. a) Define the following terms along with suitable example. **8**

i) Equality of fuzzy sets

ii) Containment of a fuzzy set

b) How fuzzy sets are represented mathematically? Illustrate with an example. **8**

3. a) Define the complements of fuzzy set with respect to two axioms. Also discuss Sugeno's and Yager's class of complement. **8**

b) Define and state the properties of **8**

i) T-norm operator

ii) S-norm operator

OR

4. a) State and verify following properties of fuzzy sets through an example. **8**

i) Law of contradiction ii) Associativity

iii) Law of excluded middle iv) De-Morgan's law

v) Involution

b) Find the union of fuzzy sets A and B for the universe of discourse $X = \{1, 2, 3, 4\rangle$ using S-norm operators: **8**

$$A = \left\{\frac{0.7}{1} + \frac{0.5}{2} + \frac{0.1}{3} + \frac{0.6}{4}\right\}$$

$$B = \left\{\frac{0.8}{2} + \frac{0.3}{3}\right\}$$

5. a) If a Linguistic variable "Bright" on the universe of discourse $X = \{1, 2, 3, 4, 5\}$ is defined as Bright as follows **8**

$$\text{Bright} = \left\{\frac{1.0}{1} + \frac{0.8}{2} + \frac{0.6}{3} + \frac{0.4}{4} + \frac{0.2}{5}\right\}$$

Find the following:

i) Not Bright ii) Very Bright

iii) Slightly Bright iv) Not very Bright

v) Very very Bright

b) Define Linguistic variable with the help of example. Also discuss the following classification of linguistic variable with an example. **8**

i) Primary terms

ii) Linguistic hedges

iii) Negation / Complement and connectives

OR

6. a) Illustrate the functions of Biological Neuron. Discuss how artificial neuron models are inspired from biological neurons. **8**

b) What is artificial neural network? Give it's strength and applications. **8**

7. a) Define activation function and it's role in artificial neural network. Discuss different types of activation function. **8**

b) Differentiate between: **8**

i) Hebbian Vs. Perceptron Learning rute

OR

8. a) Draw and discuss McCulloch-Pitts Neuron model with it's characteristics. **8**

b) Draw and discuss the architecture of feed forward neural network. **8**

9. a) What are the different algorithms are available for developing machine learning models? Explain any one in details. **8**

b) What is machine learning? List out it's type. Also explain any one into details. **8**

OR

10. a) Define Perceptron. Illustrate the basic concept of pattern classifier with the help of neat block diagram. **8**

b) Illustrate general learning rule for updating the weight parameter in Artificial Neural Network. **8**

****