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

ET805M-1 - Introduction of Neural Network and Artificial Intelligence

P. Pages : 2

Time : Three Hours

30 48

Max. Marks : 80

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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) List out the different industrial applications of Fuzzy logic based system. Discuss any one applications in detail. **8**

OR

2. a) Fuzzy sets $A = \left\{ {}^{0.9}\!/_1 + {}^{0.7}\!/_2 + {}^{0.5}\!/_3 + {}^{0.4}\!/_4 \right\}$ and $B = \left\{ {}^{0.6}\!/_1 + {}^{0.8}\!/_2 + {}^{0.3}\!/_3 + {}^{0.1}\!/_4 \right\}$ **8**
Calculate the following set Theoretic operations on fuzzy sets.
i) $A \cup B$ ii) $A \cap B$
iii) $\bar{A}$ iv) $\bar{B}$

b) Define the following nomenclatures used in fuzzy set theory. **8**
i) Support   ii) Core
iii) Cross-over points   iv) Height

3. a) State and verify the following properties of fuzzy sets through an example. **8**
i) Law of contradiction.   ii) Associativity.
iii) Law of Excluded middle.   iv) Idempotency

b) Define fuzzy number. Fuzzy sets A and B with universe of discourse $X \in [-20, 20]$ as given below **8**
$A = {}^{0.3}\!/_1 + {}^{0.6}\!/_2 + {}^{1.0}\!/_3 + {}^{0.7}\!/_4 + {}^{0.2}\!/_5$
$B = {}^{0.5}\!/_{10} + {}^{1.0}\!/_{11} + {}^{0.5}\!/_{12}$
Find Addition and substraction of fuzzy numbers A and B.

OR

4. a) Find and plot the distances $d(A,B)$, $d(A,C)$ and $d(B,C)$ for the fuzzy sets A, B and C given below with the universe of Discourse **8**
$X = \{1, 2, 3, 4, 5, 6, 7, 8\}$
$A = \{(2, 0.7), (3, 0.3), (4, 0.9), (5, 1.0)\}$
$B = \{(1, 0.2), (2, 0.4), (3, 1.0)\}$
$C = \{(5, 0.3), (6, 0.8), (7, 1.0), (8, 0.5)\}$

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b) Fuzzy sets A and B with universe of Discourse $X \in N$ as given below **8**

$$A = \frac{0.3}{2} + \frac{0.6}{4} + \frac{1.0}{6}$$

$$B = \frac{0.5}{1} + \frac{1.0}{2} + \frac{0.5}{4}$$

Find the multiplication and Division of Fuzzy numbers A and B.

5. a) Define linguistic variable with the help of example. Also discuss the following **8**
classification of linguistic variable with an example.
   i)   Primary terms
   ii) Linguistic hedges
   iii) Negation / Complement and connectives.

b) If a linguistic variable "Bright" on the universe of discourse X = {1, 2, 3, 4, 5} is defined **8**
as 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) Very Very Bright

OR

6. a) What is Artificial Neural Network? Give it's strength and applications. **8**

b) Illustrate the functions of biological neuron. Discuss how artificial neuron models are **8**
inspired from biological neurons.

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

b) Define activation function and it's role in ANN. Discuss different types of activation **8**
functions.

OR

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

b) Differentiate between. **8**

   i)   Hebbian Vs Perceptron learning rule.

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

b) Illustrate general learning rule for updating the weight parameter in ANN. **8**

OR

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

b) Define perceptron. Illustrate the basic concept of pattern classifier with block diagram. **8**

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