Total No. of Questions : 12]

SEAT No. :

P840

[Total No. of Pages : 4

[4659]-99
B.E. (E & TC)
a - SOFT COMPUTING
(2008 Pattern) (Elective - III) (Semester - II)

Time : 3 Hours] *[Max. Marks : 100*

Instructions to the candidates:

1) ***Answer 3 questions from Section I and 3 questions from Section II.***
2) ***Answers to the two sections should be written in separate books.***
3) ***Neat diagrams must be drawn wherever necessary.***
4) ***Figures to the right indicate full marks.***
5) ***Your answers will be valued as a whole.***
6) ***Use of logarithmic tables slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.***
7) ***Assume suitable data, if necessary.***

SECTION - I

Q1) Write notes on (any three): **[18]**

a) Evolutionary computing.

b) Artificial neural network application in communications.

c) Hybrid fuzzy logic (FL) systems.

d) Hard computing and its limitations.

OR

Q2) a) Explain Fuzzy rules and Fuzzy algorithms with a suitable example. **[8]**

b) Consider two fuzzy sets X and Y, find Complement, Union, Intersection, Difference: **[10]**

$$X=\left\{\frac{0.5}{2},\frac{0.4}{3},\frac{0.1}{4},\frac{0.1}{5},\frac{0.3}{6},\frac{0.7}{7},\frac{0.8}{8}\right\}$$

$$Y=\left\{\frac{0.3}{2},\frac{0.8}{3},\frac{0.6}{4},\frac{0.8}{5},\frac{0.2}{6},\frac{0.2}{7},\frac{0.3}{8}\right\}$$

P.T.O.

Q3) a) Explain any one fuzzy membership function with its transfer characteristics. Describe the possible use of the same with a suitable example. **[8]**

b) Let R be a relation among the three sets **[8]**

X = {Hindi, English}

Y = {Dollar, Euro, Pound, Rupees}

Z = {India, Nepal, United States, Canada}

R (*x, y, z*) = {Hindi, Rupees, India}

{Hindi, Rupees, Nepal}

{English, Dollar, Canada}

{English, Dollar, United States}

How can R be represented for the given sets in a tabular form?

OR

Q4) a) Describe the concept of Fuzzy Logic Controller with a suitable example. **[8]**

b) Explain the situations where Fuzzy Logic controllers are more appropriate than conventional PID controllers. **[8]**

Q5) a) What are the advantages of Fuzzy Logic Controller over that of a conventional controller? **[8]**

b) Explain the Tsukamoto Fuzzy Model with a suitable example. **[8]**

OR

Q6) a) Define the following terms with reference to fuzzy inference systems: **[6]**

i) Premise (Antecedent)

ii) Conclusion (Consequent)

iii) Rule-base

b) Given a rule: IF *x* is A, THEN *y* is B, where $A=\left\{\frac{0.2}{1},\frac{0.5}{2},\frac{0.7}{3}\right\}$ and

$B=\left\{\frac{0.6}{5},\frac{0.8}{7},\frac{0.4}{9}\right\}$

Infer B' for another rule: IF *x* is A', THEN *y* is B', where $A'=\left\{\frac{0.5}{1},\frac{0.9}{2},\frac{0.3}{3}\right\}$, using Mamdani implication rule. **[10]**

SECTION - II

Q7) a) State and explain the popular topologies of neural networks. **[8]**

b) Using Mc-Culloch Pitts neuron, implement a bipolar OR function. Assume initial weights to be [1 1]. **[8]**

OR

Q8) a) What is a perceptron network? Explain the concept of a decision boundary. **[8]**

b) What is the basic limitation of a perceptron network? Explain with a suitable example. **[8]**

Q9) Train a multilayer perceptron for the inputs-output table given below, using backpropagation (steepest descent algorithm). Work out only two iterations with the starting weights as given. Assume 2-4-1 network topology, bipolar-sigmoid activation functions and learning rate = 0.1 **[16]**

Input-Output Table	Starting weights
x1, x2 are inputs and y is output	$v=\begin{bmatrix} 0.2 & 0.4 & -0.2 & 0.35 \\ 0.3 & 0.2 & -0.03 & -0.5 \end{bmatrix}$ $v0=[-0.3 \quad 0.3 \quad 0.3 \quad -0.3]$ $w=\begin{bmatrix} 0.5 \\ -0.3 \\ -0.4 \\ 0.35 \end{bmatrix}, w0=[-0.2]$

x1	x2	y
–1	–1	–1
–1	1	1
1	–1	1
1	1	–1

OR

Q10) State the various activation functions used in artificial neural networks. What are the requirements of an activation function? Explain with suitable examples. **[16]**

Q11) a) State and compare the three learning mechanisms employed in artificial networks. **[10]**

b) State and explain the differences in the Willshaw von der Marlsburg model and Kohonen model. **[8]**

OR

Q12) Write notes on (any two): **[18]**

a) Learning methods that cross-fertilize ANFIS and RBFN.

b) Hybrid Learning Algorithm employed in ANFIS.

c) Modular neural networks.