

Total No. of Questions : 10]

SEAT No. :

P2260

[Total No. of Pages : 3

[5254]-597

**B.E. (Electronics Engineering) (Semester - II)**

**SOFT COMPUTING**

**(2012 Pattern)**

*Time : 2½ Hours]*

*[Max. Marks : 70*

*Instructions to the candidates:*

- 1) *Answer Q. 1 or Q. 2, Q. 3 or Q. 4, Q. 5 or Q. 6, Q. 7 or Q. 8. and Q.9 or Q. 10.*
- 2) *Figures to the right indicate full marks.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Use of logarithmic tables slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.*
- 5) *Assume suitable data, if necessary.*

**Q1) a)** Define ANN. State characteristics of ANN. **[6]**

b) State Cover's Theorem. Discuss how it is used in RBFN. **[4]**

OR

**Q2) a)** Consider fuzzy relations : **[6]**

$$R = \begin{matrix} & y_1 & y_2 \\ \begin{matrix} x_1 \\ x_2 \end{matrix} & \begin{bmatrix} 0.7 & 0.6 \\ 0.8 & 0.3 \end{bmatrix} \end{matrix}$$

$$S = \begin{matrix} & Z_1 & Z_2 & Z_3 \\ \begin{matrix} y_1 \\ y_2 \end{matrix} & \begin{bmatrix} 0.8 & 0.5 & 0.4 \\ 0.1 & 0.6 & 0.7 \end{bmatrix} \end{matrix}$$

Find the relation  $\tilde{T} = \tilde{R} \circ \tilde{S}$  using max - product composition.

b) Explain the following terms in Backpropagation Algorithm : **[4]**

- i) Multilayer NN
- ii) Gradient Descent
- iii) Chain Rule
- iv) Error Energy

*P.T.O.*

- Q3) a) Discuss** [6]
- i) Gaussian
  - ii) Multiquadrics
  - iii) Inverse Multiquadrics mapping functions used in RBFN.

- b) Draw : [4]
- i) Convex fuzzy set
  - ii) Non - convex fuzzy set
  - iii) Normal fuzzy set
  - iv) Subnormal fuzzy set

OR

- Q4) a) Write the category, supervised/ unsupervised for the following algorithms and justify your answer.** [6]
- i) Backpropagation Algorithm
  - ii) Radial Basis function Network
  - iii) Linear Vector Quantization

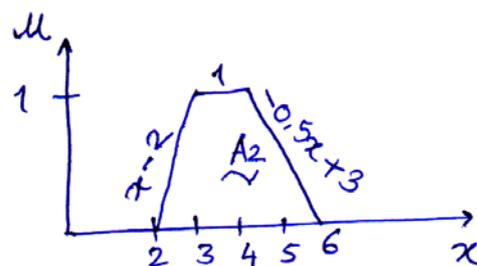
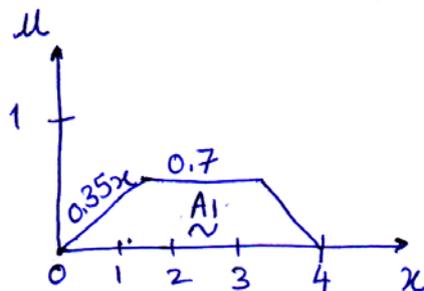
- b) Consider two fuzzy sets : [4]

$$\tilde{A} = \left\{ \frac{0.2}{1} + \frac{0.3}{2} + \frac{0.4}{3} + \frac{0.5}{4} \right\}$$

$$\tilde{B} = \left\{ \frac{0.1}{1} + \frac{0.2}{2} + \frac{0.2}{3} + \frac{1}{4} \right\}$$

Find the algebraic sum & algebraic product.

- Q5) a) For the given membership functions as shown in figure below, determine the defuzzified output value by**
- i) Centroid method [8]
  - ii) Weighted average method [2]



- b) Discuss Sugeno Fuzzy Model with neat diagram. [8]

OR

- Q6)** a) Write mathematical expressions for following fuzzy set operations : [6]

- i) Empty fuzzy set
- ii) Normal fuzzy set
- iii) Equal fuzzy set
- iv) Fuzzy Set Support
- v) Product of fuzzy sets
- vi) Fuzzy set multiplication by a crisp number

Define fuzzy set.

Give one example. [4]

- b) What is Fuzzy Inference? Discuss the three Fuzzy Implication Rules alongwith Mathematical expressions. [8]

- i) Mamdani
- ii) Dienes Rascher
- iii) Zadeh

- Q7)** a) Draw the block schematic of Conventional PID controllers & Fuzzy Logic Controllers. State any 2 advantages of FLCs. [8]

- b) Illustrate the Fuzzy Logic Mamdani Controller. [8]

OR

- Q8)** a) Discuss the input & output parameters and their membership function assignment in Aircraft Landing Control Problem. [8]

- b) Enlist 8/10 applications of FLC systems. [8]

- Q9)** a) Discuss the constraints on Adaptive Neuro-Fuzzy Inference System (ANFIS) in MATLAB. [8]

- b) Discuss the general neuro-fuzzy hybrid system with suitable block schematic. [8]

OR

- Q10)**a) State the limitations of neural networks & fuzzy systems when operated individually. [8]

- b) Discuss : How ANFIS can be applied for regression? [8]

