

**Model Question Paper**  
**IV B.Tech I Semester Regular Examinations, (R13)**

Time: 3Hrs

Max. Marks: 70

**SUBJECT: NEURAL NETWORKS & FUZZY LOGIC**

**Note: 1. Question 1 is compulsory**

**2. Answer any five questions from the remaining, choosing one from each unit**

**1. Answer the following in 4 or 5 sentences each**

2x10 = 20 Marks

- a) What are applications of neural networks?
- b) Short notes on training methods of artificial neural networks?
- c) Short notes on Delta Learning Rule?
- d) Explain about perceptron and different pattern representations?
- e) Write about Recurrent Autoassociate Memory?
- f) Short notes on spatio temporal patterns?
- g) Compare and contrast operations of classical set theory and fuzzy set theory?
- h) Explain about fuzzy logic?
- i) Define fuzzyfication?
- j) let  $X=\{a,b,c,d\}$   $Y=\{1,2,3,4\}$  and  $A^{\sim}=\{(a,0),(b,0.8),(c,0.6)(d,1)\}$   $B^{\sim}=\{(1,0.2)(2,1)(3,0.8)(4,0)\}$   $C^{\sim}=\{(1,0)(2,0.4)(3,1)(4,0.8)\}$  determine implication relations using zadeh's notations .
  - a) IF x is  $A^{\sim}$  THEN y is  $B^{\sim}$ .
  - b) IF x is  $A^{\sim}$  THEN Y is  $B^{\sim}$  ELSE Y is  $C^{\sim}$ .

**UNIT-I**

2.
  - a) Explain the structure of biological neuron and explain in detail?
  - b) Explain an neuron modeling for Artificial neuron systems and common activation functions in detailed?
- (or)
3.
  - a) Explain about any two different types of learning mechanisms with relations?
  - b) explain use of linear & nonlinear model in ANN and also show relation for error representation ?

**UNIT - II**

4.
  - a) Write a short notes on single layer and multilayer perceptron?
  - b) Show that a multilayer network with linear discriminate function is equivalent to single layer network.
- (or)
5.
  - a) Draw the architecture of multilayer perceptron and explain generalized delta learning rule ?

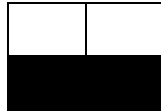
b) Consider the two classes of patterns that are shown below figures class I represent vertical lines and class II represents horizontal lines

i) Are these categories linearly separable?

ii) Design a multilayer network to distinguish these categories?



Class I



classII

### UNIT - III

6. a) Explain in details of recurrent associative memory?

b) Design a temporal associative memory the following sequence of vectors

$$s^{(1)} = [1 \ -1 \ -1 \ 1 \ -1]^t$$

$$s^{(2)} = [1 \ 1 \ -1 \ -1 \ 1]^t$$

$s^{(3)} = [1 \ -1 \ 1 \ -1 \ 1]^t$  find the memory weight matrix and obtain an recall sequence .

(or)

7. a) Explain about Bidirectional Associate Memory (BAM) and its mathematical model?

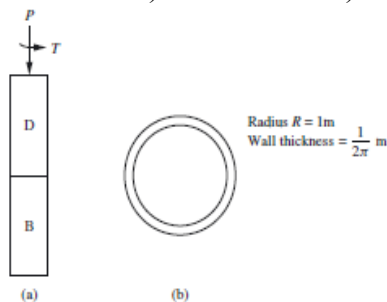
b) Explain about improved coding of memories?

### UNIT - IV

8. a) Explain relations between fuzzy and crisp sets and also its conversion?

b) A simple hollow shaft of approximately 1m radius and wall thickness  $1/(2\pi)$ m. The shaft is built by stacking a ductile section, D, of the appropriate cross section over a brittle section, B, as shown in Figure below. A downward force  $P$  and a torque  $T$  are simultaneously applied to the shaft. Because of the dimensions chosen, the nominal shear stress on any element in the shaft is  $T$  (pascals) and the nominal vertical component of stress in the shaft is  $P$  (pascals). We also assume that the failure properties of both B and D are not known with any certainty. Find relations for

i) complement ii) intersection iii) difference iv) union v) De Morgan's principles



a) Axial view b) cross sectional view

(or)

9. a) Explain the basic concept of fuzzy sets and properties of fuzzy sets?  
b) Explain about classical set theory and its operation with properties in detail?

## UNIT - V

10. a) For the given fuzzy set

$$A^{\sim} = \left\{ \frac{1}{1.0} + \frac{0.65}{1.5} + \frac{0.4}{2.0} + \frac{0.35}{2.5} + \frac{0}{3.0} \right\},$$
$$B^{\sim} = \left\{ \frac{0}{1.0} + \frac{0.25}{1.5} + \frac{0.6}{2.0} + \frac{0.25}{2.5} + \frac{1}{3.0} \right\}$$
$$C^{\sim} = \left\{ \frac{0.5}{1.0} + \frac{0.25}{1.5} + \frac{0}{2.0} + \frac{0.25}{2.5} + \frac{0.5}{3.0} \right\}$$

Solve the following:

- i)  $A \cap B^{\sim}$       ii)  $A^{\sim} \cup B^{\sim}$       iii)  $A^{\sim c}$       iv)  $B^{\sim c}$       v)  $A^{\sim c} \cup B^{\sim c}$

- b) Explain in detail about fuzzy membership functions and features?

(or)

11. a) Explain the processes of fuzzyfication and defuzzification in detail  
b) Two fuzzy sets A and B both defined on X are as follows

$\mu(x_i)$	x1	x2	x3	x4	x5	x6
$A^{\sim}$	0.1	0.7	0.8	1.0	0.7	0.1
$B^{\sim}$	1.0	0.9	0.5	0.2	0.1	0

Express the following  $\alpha$ -cut set using zadeh's notation

- i)  $(A^{\sim})_{0.6}$       ii)  $(B^{\sim})_{0.5}$       iii)  $(A^{\sim} \cup B^{\sim})_{0.8}$       iv)  $(A^{\sim} \cap B^{\sim})_{0.9}$

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