

(3 hours)

Total Marks: 80

- N.B. 1. Question No. 1 is compulsory  
 2. Attempt any **three** out of remaining  
 3. Assume suitable data if **necessary** and justify the assumptions  
 4. Figures to the **right** indicate full marks

- Q1 A Determine the similarities and differences between MLP model with RBFN. 05
- B Show Mc-Culloch Pitt neuron to implement following data. 05  
 D is a desired output. Determine Weight vector  
 $W = [w_1 \ w_2]$
- | X1 | X2 | D |
|----|----|---|
| 0  | 0  | 0 |
| 0  | 1  | 1 |
| 1  | 0  | 0 |
| 1  | 1  | 1 |
- C For the fuzzy set  $B = \{0.3/p + 0.8/q + 0.8/r + 0.6/s + 0/t + 0.4/u\}$  Show support, core, normality & all possible  $\alpha$ -cut sets. 05
- D What is velocity and cognitive component in Particle Swarm Optimization? 05
- Q2 A Describe ANT colony algorithm. What kind of problems can be solved using it? 10
- B Using Hebb learning rule for the given data and initial weights, show two iteration and determine the cluster of the following new pattern:  $X = [0.9 \ -0.3]$ . Assume Bipolar Binary activation function and learning constant = 1. 10  
 $X_1 = [1 \ 0.9]$ ,  $X_2 = [0.9 \ -0.5]$ ,  $X_3 = [-0.9 \ 1.2]$ ,  $X_4 = [-0.9 \ -0.6]$ ,  
 $D = [1 \ 1 \ 1 \ -1]$ ,  $W_1 = [0.1 \ -0.1]$ .
- Q3 A Describe Binary SVM in brief. 10
- B For the following fuzzy sets 10  
 $good\_service = \{1/a + 0.8/b + 0.6/c + 0.4/d + 0.2/e\}$  and  
 $satisfied = \{0.2/1 + 0.4/2 + 0.6/3 + 0.8/4 + 1.0/5\}$   
 Determine  
 (a) Construct the relation for the rule IF x is A THEN y is B (i.e., IF x is “good\_service” THEN y is “satisfied”) using the Mamdani implication.  
 (b) If we introduce a new antecedent  
 $Very\_good\_service = \{0.8/a + 0.6/b + 0.4/c + 0.0/d + 0.0/e\}$  find the new consequent  $B'$  (very satisfied), using max–min composition.
- Q4 A Write SDPTA algorithm and explain each step. Show clearly the stopping conditions. 10
- B Describe Binary SVM with proper example. 10

[TURN OVER]

- Q5 A Define and draw different membership functions used in Fuzzy sets. 10
- B Show with example Mutation and Crossover methods used in Genetic Algorithm. 10
- Q6 A Speed sensor reads the speed of the motor from certain controller. U for speed is SLOW, MODERATE AND FAST and the range is 0 to 1000 rpm. Define and draw these three membership functions and hence fuzzify the given input reading from the sensor 600rpm into fuzzy set Speed. 10
- B What are linearly non-separable patterns? Show with the diagram and explain how this problem can be handled? 10
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