

CS/B.Tech/IT/Odd/Sem-7th/IT-703B/2014-15

S/B.Tech/IT/Odd/Sem-7th/IT-703B/2014-15

IT-703B
SOFT COMPUTING

Time Allotted: 3 Hours

Full Marks

*The questions are of equal value.
The figures in the margin indicate full marks.
Candidates are required to give their answers in their own words as far as practicable.*

GROUP A
(Multiple Choice Type Questions)

1. Answer any ten questions. 10×1 =
- (i) The AND function with bipolar inputs and targets is realized by Hebb net, because
 (A) the problem is not linearly separable
 (B) the problem is linearly separable
 (C) the Hebb learning rule has the correlational mechanism
 (D) none of these
- (ii) The competitive learning rule is suited for
 (A) unsupervised network training
 (B) supervised network training
 (C) reinforced network training
 (D) none of these
- (iii) The Madeline network is
 (A) the combination of two single layered feed forward neural networks.
 (B) a type of multilayered feed forward neural network with multiple neurons in output layer.
 (C) the combination of adaline networks and multilayered feed forward network with one neuron in output layer.
 (D) a type of feedback network.
- (iv) Discrete Hopfield net is a
 (A) feed forward network
 (B) feedback network
 (C) recurrent network
 (D) none of these

- (v) The neighborhood scheme for SOM is used
 (A) to find out the neurons of which weight vector to be updated along with winner neuron.
 (B) to find out the neurons of which weight vector to be updated excluding winner neuron.
 (C) to converge the net faster.
 (D) to find out the winner neuron in the net.
- (vi) The predicate logic statement of "A likes some of which B likes" is
 (A) $\forall x (\text{likes}(B, x) \Rightarrow \text{likes}(A, x))$
 (B) $\forall x (B, x) \Rightarrow \text{likes}(A, x)$
 (C) $\exists x (\text{likes}(B, x) \wedge \text{likes}(A, x))$
 (D) $\exists x (\text{likes}(B, x) \wedge \text{likes}(A, x))$
- (vii) When the fitness values of chromosomes in GA differ very much the best reproduction operator is
 (A) roulette-wheel selection
 (B) tournament selection
 (C) rank selection
 (D) none of these
- (viii) The Genetic algorithm does not need any auxiliary information and provides the
 (A) the set of feasible solutions
 (B) local optimal solution
 (C) global optimal solution
 (D) none of these
- (ix) The backpropagation network is based on
 (A) Hebbian learning rule
 (B) perceptron learning rule
 (C) delta learning rule
 (D) none of these
- (x) The proposition logic lacks the ability to symbolize
 (A) quantification
 (B) connectivity
 (C) equivalence
 (D) negation
- (xi) In fuzzy logic if x is A then y is B is equivalent to
 (A) $(A \times B) \cup (A^c \times Y)$
 (B) $(A \times B) \cup (A \times Y)$
 (C) $(A \times B^c) \cup (A \times Y)$
 (D) $(A \times B) \cup (A^c \times Y^c)$

CS/B.Tech/IT/Odd/Sem-7th/IT-703B/2014-15

GROUP B
(Short Answer Type Questions)

Answer any three questions.

3×5 = 15

2. Compare between supervised and unsupervised learning with proper diagram. 5
3. Discuss about different activation function used of training artificial neural network. 5
4. Describe with examples the different types of crossover operations during reproduction process. 5
5. Let $A = \{(3, 0.5), (5, 1), (7, 0.6)\}$ and $B = \{(3, 1), (5, 0.6)\}$. Then obtain (i) $A \cup B$ and (ii) $A \times B$ 2.5+2.5
6. Define the α -cut and α -level sets with example. 2.5+2.5

GROUP C
(Long Answer Type Questions)

Answer any three questions.

3×15 = 45

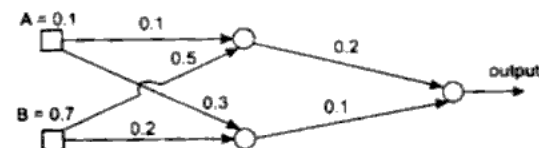
7. (a) Consider two fuzzy sets $A = 1/2.0 + 0.65/4.0 + 0.5/6.0 + 0.35/8.0 + 0/10.0$ and $B = 0/2.0 + 0.35/4.0 + 0.5/6.0 + 0.65/8.0 + 1/10.0$. Show that the above fuzzy sets satisfy the DeMorgan's Law. 5
- (b) Find max-min composition of the following fuzzy set. 10

		y_1	y_2	y_3	y_4	y_5		z_1	z_2	z_3	z_4	
$R_1 =$	x_1	0.1	0.2	0	1	0.7	$S_2 =$	y_1	0.9	0	0.3	0.4
	x_2	0.3	0.5	0	0.2	1		y_2	0.2	1	0.8	0
	x_3	0.8	0	1	0.4	0.3		y_3	0.8	0	0.7	1
								y_4	0.4	0.2	0.3	0
								y_5	0	1	0	0.8

8. What is linguistic variable? Let $X = \{a, b, c, d\}$ $Y = \{1, 2, 3, 4\}$ and $A = \{(a, 0), (b, 0.8), (c, 0.6), (d, 1)\}$ $B = \{(1, 0.2), (2, 1), (3, 0.8), (4, 0)\}$ $C = \{(1, 0), (2, 0.4), (3, 1), (4, 0.8)\}$. Determine the implication relation (i) "IF x is A THEN y is B ". (ii) "IF x is A THEN y is B ELSE y in C ". 2+6+7

CS/B.Tech/IT/Odd/Sem-7th/IT-703B/2014-15

9. (a) Try a training pass for the following multi-layer feed forward network using back-propagation learning algorithm. Learning rate parameter $\eta = 1$. Also assume the activation function for each neuron is the sigmoid function. Desired response of the applied pattern is assumed to be 0.5. 10



- (b) Briefly explain competitive learning mechanism of neural network with example. 5

10. (a) Describe how Genetic algorithm differ from other optimization and search procedure. 4
- (b) Two fuzzy sets A and B both defined on x as follows 5

$M(x)$	x_1	x_2	x_3	x_4	x_5	x_6
A	0.1	0.6	0.8	0.9	0.7	0.1
B	0.9	0.7	0.5	0.2	0.1	0

Express the following α -cut sets

- (i) $(A \cup B)_{0.4}$ (ii) $(A \cup \bar{A})_{0.7}$ (iii) $(\bar{A} \cap \bar{B})_{0.7}$ (iv) $(\bar{A} \cup \bar{B})_{0.7}$

- (c) Develop reasonable membership function for the following fuzzy sets based upon height measured in centimeters (i) Tall (ii) Short (iii) Medium height. 6

11. Write short notes on any three of the following 3×5

- (a) Self organizing map
- (b) Mutation
- (c) Defuzzification method
- (d) Hebbian learning mechanism
- (e) Biological neural vs ANN.