

Seat No. : _____

AI2-119
April-2016
M.Sc., Sem.-VIII
Soft Computing

Time : 3 Hours]

[Max. Marks : 100

1. (A) Explain any three techniques of soft computing in brief. **6**
- (B) Write a short note on the following : (Any 2) **6**
- (i) Multilayer feed-forward network
 - (ii) Unsupervised learning
 - (iii) Reinforcement learning
- (C) Explain following terms : **8**
- (i) Bias
 - (ii) Threshold
 - (iii) Learning rate
 - (iv) Momentum factor
2. (A) What does it mean by associative memory networks ? **2**
- (B) Answer the following : (Any 3) **18**
- (i) Write an algorithm for perception network testing.
 - (ii) Write a short note on simulated annealing network.
 - (iii) Write an algorithm for perceptron training for single output class.
 - (iv) Write a short note on back propagation network.

3. Answer the following : (Any 4)

20

(A) Define :

- (i) Cardinality of a Set
- (ii) Degree of Membership
- (iii) Singleton Set
- (iv) Tautology
- (v) Defuzzification

(B) Given two fuzzy sets, as below :

$$\tilde{N} = \{(0, 0), (10, 0.2), (20, 0.35), (30, 0.65), (40, 0.85), (50, 1)\}$$

$$\tilde{A} = \{(0, 0), (10, 0.35), (20, 0.25), (30, 0.8), (40, 0.95), (50, 1)\}$$

Perform the following operations :

$$(i) \tilde{A} \oplus \tilde{N} \quad (ii) \tilde{A}' \quad (iii) \tilde{N}^2 \quad (iv) \tilde{A} \cup \tilde{N} \quad (v) \tilde{A} \cap \tilde{N}$$

(C) Given three crisp sets as below :

X = Set of numbers that are Multiples of 4 less than 21

Y = Set of numbers that are Factors of 12

Z = Set of natural numbers less than 6

And two relations as below :

$$R = \{(x, y) / x \leq y ; x \in X ; y \in Y\}$$

$$S = \{(y, z) / y + z \text{ is even} ; y \in Y ; z \in Z\}$$

Find the Max-min composition – $R \circ S$

(D) ABC Jewellers Ltd. has some data for the price of Gold per gram and the demand of gold in grams.

Apply Fuzzy Modus Ponens rule to derive - Demand of Gold is very low.
Here, given is -

(i) If Price of Gold is high, then Demand of Gold is Low

(ii) Price of Gold is very high

The statistics is given below :

Set of Prices of Gold $P = \{2200, 2300, 2400, 2500, 2600, 2700, 2800, 2900, 3000\}$

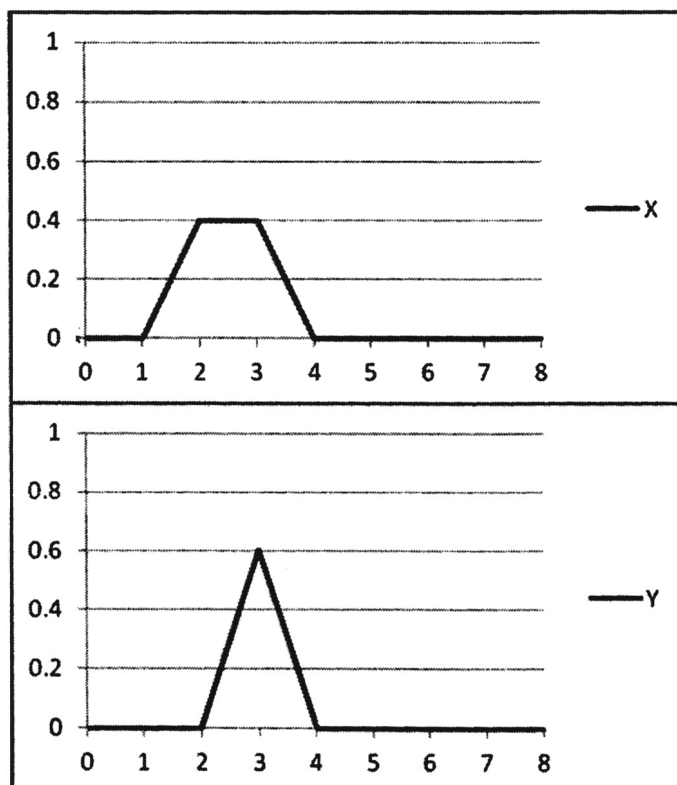
Set of Demand of Gold $D = \{0, 100, 200, 300, 400, 500\}$

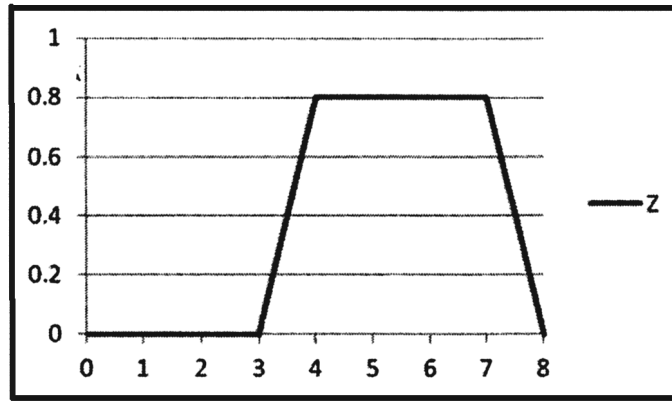
Fuzzy set Price is High $PH_{\sim} = \{ (2600, 0.25), (2700, 0.6), (2800, 1) \}$

Fuzzy set Demand is Low $DL_{\sim} = \{ (100, 0.8), (200, 0.4), (300, 0.1) \}$

Fuzzy set Price is very High $PVH_{\sim} = \{ (2800, 0.8), (2900, 0.9), (3000, 1) \}$

(E) Given three fuzzy sets X, Y, Z with their membership functions. Form the Aggregated Fuzzy Set and find X^* using any two methods.





4. Answer the following :

20

- (A) Write down steps for designing a Fuzzy Logic Controller.
- (B) List out any five applications of Fuzzy Logic Control Systems and explain any one in detail.
- (C) Write a short note on encoding. Explain any three encoding.
- (D) Explain rank selection.

5. (A) Explain different classes of hybrid systems.

6

(B) Explain any three cross over operations.

6

(C) Explain the following :

8

- (i) inversion
- (ii) Deletion and duplication
- (iii) Segregation
- (iv) Cross over and inversion