

(3 Hours)

[Total Marks: 80]

- N.B.:**
- 1) Question No.1 is **compulsory**.
 - 2) Attempt any **three** from the remaining questions.
 - 3) Use of calculator is allowed.

1. Attempt the following (20)

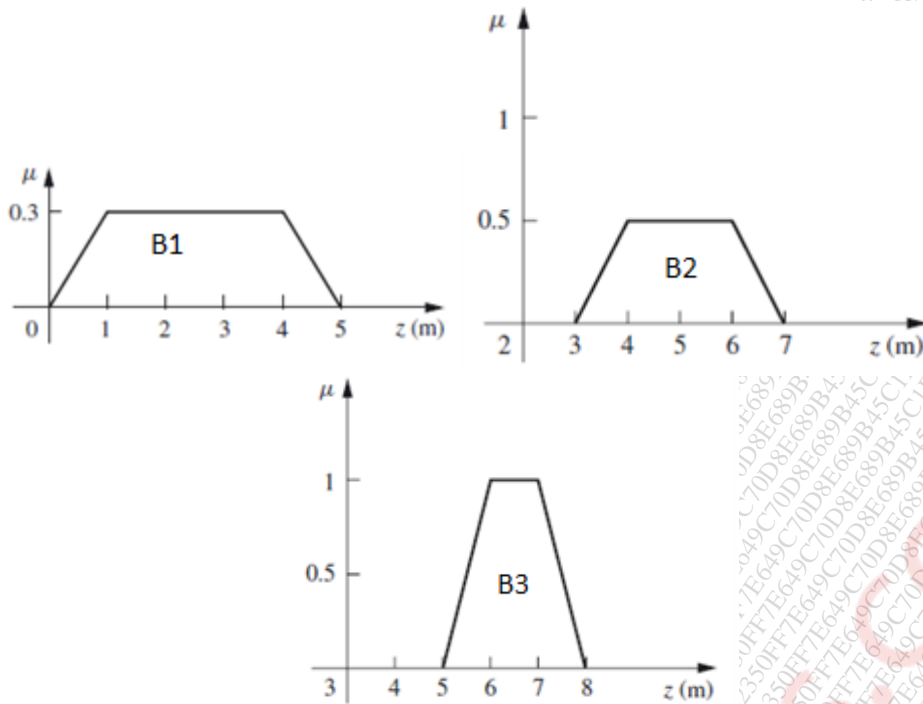
- a) Differentiate between Brain and Artificial Neural Network
- b) Using Zadeh's notation, determine the λ -cut sets for the given fuzzy sets (A & B) :

$$A = \left\{ \frac{0.9}{x_1} + \frac{0.7}{x_2} + \frac{0.5}{x_3} + \frac{0.4}{x_4} + \frac{1}{x_5} \right\} \quad B = \left\{ \frac{0.3}{x_1} + \frac{0.5}{x_2} + \frac{0.7}{x_3} + \frac{1}{x_4} + \frac{0.8}{x_5} \right\}$$

Express the following for $\lambda = 0.6$

1. $A \cap B$ 2. $A \cup B$ 3. $\overline{A \cup B}$ 4. $\overline{A} \cup \overline{B}$ 5. $\overline{A \cap B}$

- c) Differentiate between hard computing and soft computing.
 - d) Describe agent and list the types of it. Explain any one agent in brief.
2. (a) What is state space search? Define state space search for the following problem – (10)
 “Consider two water jugs A & B. the jugs have no measuring marks. The capacity of jug A is 3 liters and B is 5 liters. Assume unlimited water supply is available. The water can be filled in a jug from a tap, and there is a ground on which water may be poured. Now can you get exactly 4 liters of water in the jug B? ”
- (b) What is Fuzzy Inference system (FIS)? Explain Takagi Sugeno FIS in brief with suitable diagram. List the advantages of Sugeno FIS. (10)
3. (a) Explain Relational knowledge, Inheritable knowledge with the help of suitable example. (10)
- (b) What is Genetic Algorithm (GA)? Draw flow chart of GA. Explain any two selection methods in GA. (10)
4. (a) What is heuristic function? Explain simple hill climbing algorithm along with a state space diagram of hill climbing. (10)
- (b) For a given membership function as shown in figure below, determine the defuzzified output value by (10)
1. Centroid method
 2. Centre of sums



5. (a) Explain perceptron training algorithm. (10)

Find the weights using perceptron network for ANDNOT function when all the inputs are presented only one time. Use bipolar inputs and target. Learning rate $(\alpha)=1$ and threshold $(\theta) = 0$

The truth table for ANDNOT function is as follows

X1	X2	T
1	1	-1
1	-1	1
-1	1	-1
-1	-1	-1

(b) Differentiate between traditional algorithm and genetic algorithm and explain in brief crossover operation in GA. (10)

6. (a) Three elements for a medicinal research are defined as (05)

$$D = \left\{ \frac{0.3}{0} + \frac{0.7}{1} + \frac{1}{2} \right\} \quad I = \left\{ \frac{0.5}{20} + \frac{0.75}{30} + \frac{0.6}{40} \right\} \quad V = \left\{ \frac{0.7}{20} + \frac{0.8}{30} + \frac{0.5}{40} \right\}$$

Based on these membership functions, find the following

- $R = D \times I$
- Max-min composition $V \circ R$

(b) Write a short note on unsupervised network. (05)

(c) Using the inference approach find the membership values for triangular shapes Isosceles(I), Right angle(R), Equilateral (E), Isosceles Right angle (IR) and other (T) for a triangle with angles (in degrees) 60, 60, 60. (05)

(d) What is semantic net? Explain with the help of suitable example. (05)