Registration no: | | | | | | | | | | |

Total Number of Pages: 02

B.Tech.
Subject Code: OEEC6437

7th Semester Regular/ Back Paper Examination December 2022
Subject Name: Soft Computing
Branch: ALL
Time: 3 Hours
Max Marks: 60
Question Code:
Answer Question No.1 which is compulsory and any five from the rest.
The figures in the right-hand margin indicate marks.

Q1 **Answer the following questions:** **(1x10)**

a) Why Genetic algorithm is better than conventional optimization technique?
b) Briefly explain sequential hybrid system with a diagram.
c) What a learning rate coefficient determines?
d) What is recurrent neural network?
e) Is crossover mandatory as a reproduction operator?
f) Given the following two fuzzy sets, find $\bar{A}$ and $A \cap B$.

$$\tilde{A} = \left\{\frac{0.1}{0} + \frac{0.5}{1} + \frac{0.9}{2} + \frac{1}{3} + \frac{0.4}{4}\right\}$$

$$\tilde{B} = \left\{\frac{0.2}{0} + \frac{0.7}{1} + \frac{0.3}{2} + \frac{0.8}{3} + \frac{0.6}{4}\right\}$$

g) What is auto-associative memory network?
h) Explain features of fuzzy membership function.
i) Difference between exploration and exploitation.
j) What is activation function? Explain with an example.

Q2 a) Describe the ADALINE network with the diagram. Write the difference between MADALINE and ADALINE network. **(5)**

b) What is artificial neural network? Define characteristics and application of neural network. **(5)**

Q3 a) Determine the implication relation **(5)**

(i) if X is A then Y is B
(ii) if X is A, then Y is B else Y is C

Given: X={a, b, c, d} Y={1, 2, 3, 4}

$$\tilde{A} = \{(a, 0.3), (b, 0.8), (c, 0.6), (d, 0.7)\}$$

$$\breve{B} = \{(1,0.2), (2,1), (3,0.9), (4,0.6)\}$$

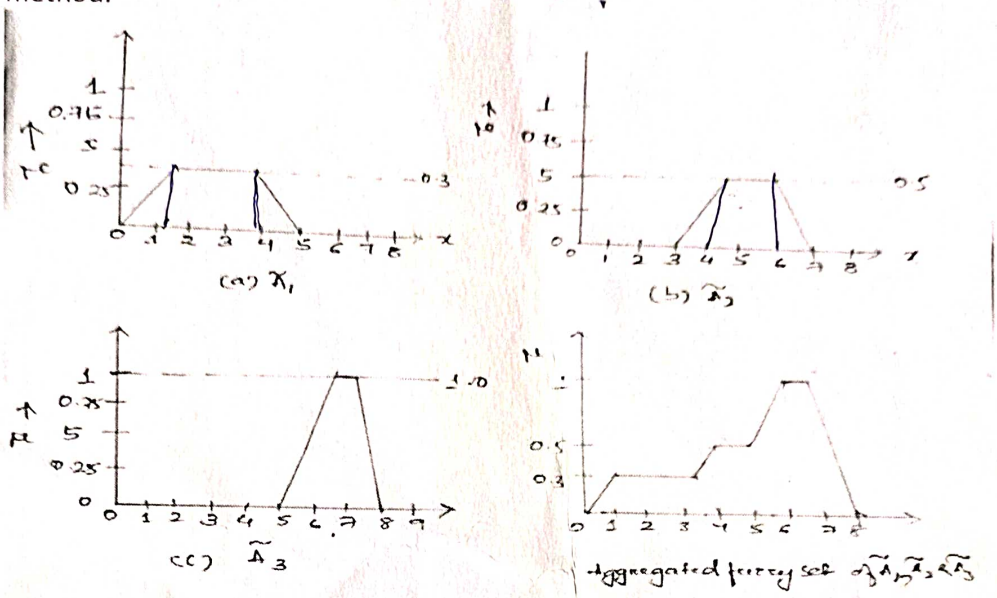
$$\tilde{C} = \{(1,0.2), (2,0.4), (3,0.5), (4,0.8)\}$$

b) Describe in detail fuzzy sets and membership functions. What are different set theoretic operations. **(5)**

Q4 a) What is the drawback of GA? Explain with one example a single point crossover operator. Why crossover probability is higher than mutation probability? **(5)**

b) Give the weight matrix of Mc Culloch-Pitts neuron model for binary AND function. **(5)**

Q5 a) $\tilde{A}_1$, $\tilde{A}_2$ and $\tilde{A}_3$ are three fuzzy set shown in figure (a), (b) and (c). Find the defuzzification using centroid method, centre of sum method and mean of maxima method. (5)



b) Draw block diagram of fuzzy inference system and explain functions of each block of fuzzy inference system. (5)

Q6 a) Consider the following patterns: (5)

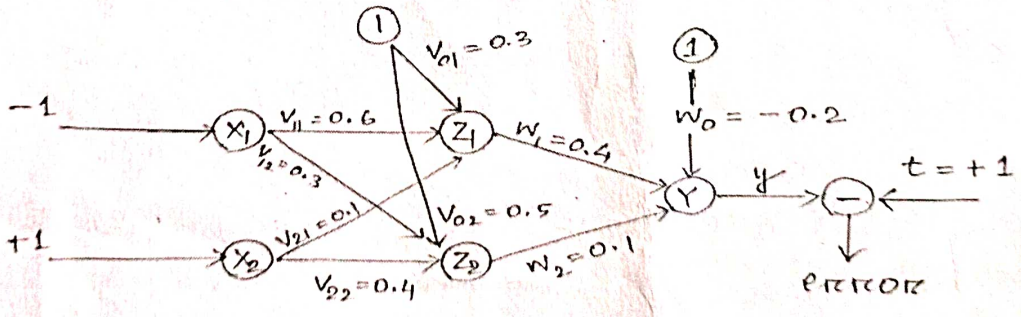
A_1= (-1, 1, -1, 1) A_2= (1, 1, 1, -1) A_3= (-1, -1, -1, 1)

a) Check whether A'= (1, 1, 1, -1) is a stored pattern or not.

b) Check whether A'=(1, 1, 1, 1) is a noisy pattern of which pattern.

b) Explain all types of Crossover in Genetic algorithm. (5)

Q7 a) Find the new weights using back propagation algorithm for the network shown below. Take input patterns as [-1, +1] and target output is +1. Use learning rate of α is 0.25 and bipolar sigmoidal activation function. (5)



b) What is learning in ANN? Explain different learning methods in detail. (5)

Q8 **Write short notes on any two:** (5x2)

a) Mamdani FIS and Tsukamoto FIS

b) Perceptron

c) Neuro-Fuzzy Hybrid System

d) Mutation