Printed Page:- Subject Code:- ACSE0307

Roll. No:

NOIDA INSTITUTE OF ENGINEERING AND TECHNOLOGY, GREATER NOIDA

(An Autonomous Institute Affiliated to AKTU, Lucknow)

B.Tech.

SEM: III - THEORY EXAMINATION (2021 - 2022)

Subject: Soft Computing

Time: 03:00 Hours Max. Marks: 100

General Instructions:

1. All questions are compulsory. It comprises of three Sections A, B and C.

- Section A - Question No- 1 is objective type question carrying 1 mark each & Question No- 2 is very short type questions carrying 2 marks each.
- Section B - Question No- 3 is Long answer type - I questions carrying 6 marks each.
- Section C - Question No- 4 to 8 are Long answer type - II questions carrying 10 marks each.
- No sheet should be left blank. Any written material after a Blank sheet will not be evaluated/checked.

SECTION A 20

1. Attempt all parts:-

1-a. Who initiated the idea of Soft Computing? (CO1) 1

1. Charles Darwin
2. Lotfi A Zadeh
3. Rechenberg
4. Mc_Culloch

1-b. Core of soft Computing is ..... (CO1) 1

1. Fuzzy Computing, Neural Computing, Genetic Algorithms
2. Fuzzy Networks and Artificial Intelligence
3. Artificial Intelligence and Neural Science
4. Neural Science and Genetic Science

1-c. In Feed Forward ANN, information flow is _____ (CO2) 1

1. unidirectional
2. Bidirectional
3. Mutidirectional
4. All of the above

1-d. What is full form of ANNs? (CO2) 1

1. Artificial Neural Networks
2. Artificial Neural numbers
3. Artificial Neural Node
4. none of the mentioned

1-e. Which one cannot be stated using fuzzy logic? (CO3) 1

1. Color of an apple
2. Height of a person
3. Date of birth of a student
4. Speed of a car

1-f. Fuzzy logic is a form of _____ . (CO4) 1

1. Two-valued logic
2. Crisp set logic
3. Many-valued logic
4. Binary set logic

1-g. Defuzzification is done to obtain _____ . (CO4) 1

1. Crisp output
2. The best rule to follow
3. Precise fuzzy value
4. None of the above

1-h. If $\tilde{A}$ and $\tilde{B}$ are two fuzzy sets with membership functions: $\mu \tilde{A}(x)$ ={0.2,0.5.,0.6,0.1,0.9}, $\mu \tilde{B}(x)$= {0.1,0.5,0.2,0.7,0.8} then the value of $\mu \tilde{A} \cap \mu \tilde{B}$ will be _____ . (CO3) 1

1. {0.2,0.5,0.6,0.7,0.9}
2. {0.2, 0.5,0.2, 0.1,0.8}
3. {0.1, 0.5, 0.6, 0.1,0.8}
4. {0.1, 0.5, 0.2, 0.1,0.8}

1-i. Which one method is used for Selection of Population? (CO5) 1

1. Tournament
2. Flipping
3. Uniform
4. All

1-j. Matrix Crossover is based on _____ . (CO5) 1

1. One dimensional crossover
2. Two dimensional crossover
3. N dimensional crossover
4. none

2. Attempt all parts:-

2-a. Write two applications of Soft Computing. (CO1) 2

2-b. Define Supervised Learning in brief. (CO2) 2

2-c. Differentiate between Fuzzy sets and Crisp sets. (CO3) 2

2-d. Discuss the Concept of Fuzzification in brief. (CO4) 2

2-e. Draw and explain the basic structure of Genetic Algorithm. (CO5) 2

SECTION B 30

3. Answer any five of the following:-

3-a. How human brain is related to ANN? (CO1) 6

3-b. Describe the linear and nonlinear activation functions used in Artificial Neural Networks. (CO2) 6

3-c. Implement Logical AND function with MC- Culloch - Pitts neural model. (CO2) 6

3-d. Explain the working of Adaline neural network with suitable diagram. (CO2) 6

3-e. Let two fuzzy sets $\tilde{A}$ = {(x1,0.7),(x2,0.3),(x3,0.2),(x4,0.1)}, $\tilde{B}$ = {(x1,0.6),(x2,0.5),(x3,0.6),(x4,0.2)}. Calculate the Union and Intersection operation on the fuzzy sets $\tilde{A}$, $\tilde{B}$. (CO3) 6

3-f. What are the components of fuzzy logic controller ? Explain them in detail with block diagram. (CO4) 6

3-g. Explain three Cross-over operations performed in GA. (CO5) 6

SECTION C 50

4. Answer any one of the following:-

4-a. Explain Various types of Soft Computing Techniques. (CO1) 10

4-b. Differentiate Hard computing and Soft-computing in detail . (CO1) 10

5. Answer any one of the following:-

5-a. Compute the Neural Network output for input x1=0.1, x2=0.5, and bias input =1 with fixed weight of 0.2 for every input used here. Use binary sigmoidal function as a activation function. (CO2) 10

5-b. Draw and explain the Multilayer Feedforward ANN model through an appropriate example. (CO2) 10

6. Answer any one of the following:-

6-a. The task is to recognize English alphabetical characters (F, E, X, Y, I, T) in an image processing system. Two fuzzy sets $\tilde{I}$ and $\tilde{F}$ are defined to represent the identification of characters I and F. 10

Let $\tilde{I}$ = {(F, 0.4), (E, 0.3) (X, 0.1), (Y, 0.1), (I, 0.9), (T,0.8)} ,

$\tilde{F}$ = {(F, 0.99), (E, 0.8), (X,0.1), (Y; 0.2), (I,0.5), (T, 0.5)}

Find the following: (i) $\tilde{I} \cup \tilde{F}$ (ii) $\tilde{I} - \tilde{F}$ (iii) $\tilde{F} \cup \overline{\tilde{F}}$ (iv) Verify de Morgan's law (CO3)

6-b. Describe Fuzzy relation and explain its various operations. (CO3) 10

7. Answer any one of the following:-

7-a. Let us consider two sets of variables x and y be X = {x1, x2, x3} and Y = {y1, y2}, respectively. Also, 10

let us consider the following. $\tilde{A}$ = {(x1, 0.5),(x2, 1),(x3, 0.6)} $\tilde{B}$ = {(y1, 1),(y2, 0.4)}

Then, given a fact expressed by the proposition x is $\tilde{A}'$. where $\tilde{A}'$ = {(x1, 0.6),(x2, 0.9),(x3, 0.7)}

Derive a conclusion in the form y is $\tilde{B}'$ (using generalized modus ponens (GMP)). (CO4)

7-b. Let X: {a, b, c, d} Y : {1,2,3,4} 10

$\tilde{A}'$: {(a,0) (b,0.8) (c,0.6) (d, 1)},

$\tilde{B}'$: {(1,0.2) (2,1) (3, 0.8) (4, 0)}

$\tilde{C}'$: {(1, 0) (2,0.4) (3, 1) (4, 0.8)}

Determine the implication relations (i) If x is $\tilde{A}'$ then y is $\tilde{B}'$ (ii) If x is $\tilde{A}'$ then y is $\tilde{B}'$ else y is $\tilde{C}'$ (CO4)

8. Answer any <u>one</u> of the following:-

8-a.	State the procedure of Genetic Algorithm and Draw the flow chart of Genetic Algorithm. Explain the Biological Background of GA. (CO5)	10
8-b.	What do you understand by Tournament Selection? How does it overcomes the demerit of Roulette Wheel Selection method? (CO5)	10