Printed Page:- 04 **Subject Code:- ACSE0307**

Roll. No:

NOIDA INSTITUTE OF ENGINEERING AND TECHNOLOGY, GREATER NOIDA

(An Autonomous Institute Affiliated to AKTU, Lucknow)

B.Tech

SEM: III - CARRY OVER THEORY EXAMINATION - AUGUST 2023

Subject: Soft Computing

Time: 3 Hours **Max. Marks: 100**

General Instructions:

IMP: *Verify that you have received the question paper with the correct course, code, branch etc.*

1. *This Question paper comprises of* **three Sections -A, B, & C.** *It consists of Multiple Choice Questions (MCQ's) & Subjective type questions.*

2. *Maximum marks for each question are indicated on right -hand side of each question.*

3. *Illustrate your answers with neat sketches wherever necessary.*

4. *Assume suitable data if necessary.*

5. *Preferably, write the answers in sequential order.*

6. *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

(a) Charles Darwin

(b) Lotfi A Zadeh

(c) Rechenberg

(d) Mc_Culloch

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

(a) Fuzzy Computing, Neural Computing, Genetic Algorithms

(b) Fuzzy Networks and Artificial Intelligence

(c) Artificial Intelligence and Neural Science

(d) Neural Science and Genetic Science

1-c. In which ANN, loops are allowed? (CO2) 1

(a) Feed Forward ANN

(b) Feedback ANN

(c) Both Feed Forward and Feedback ANN

(d) None of these

1-d. Which is true for neural networks? (CO2) 1

(a) It has set of nodes and connections

(b) Each node computes it's weighted input

(c) Node could be in excited state or non-excited state

(d) All of the mentioned

1-e. The cardinality of the given set A= {2,4,6,8} is: (CO3) 1

(a) 2

(b) 5

(c) 4

(d) 1

1-f. Consider two fuzzy sets A and B with their membership functions μ_A and μ_B. Then De Morgan's law can be defined as (CO3) 1

(a) $(A \cup B)^c = A^c \cup B^c$

(b) $(A \cup B)^c = A^c \cap B^c$

(c) $(A \cup B)^c = A^c \cup B^c$

(d) $(A \cup B)^c = A^c \cap B^c$

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

(a) Crisp output

(b) The best rule to follow

(c) Precise fuzzy value

(d) None of the above

1-h. Fuzzy rules is usually represented as : (CO4) 1

(a) IF-THEN-ELSE rules

(b) IF-THEN rules

(c) Both IF-THEN-ELSE rules & IF-THEN rules

(d) None of the Above

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

(a) Tournament

(b) Flipping

(c) Uniform

(d) All

1-j. "Cross over probability is 1" states that: (CO5) 1

(a) all offspring are made by cross over

(b) Offspring is made from exact copies of chromosomes

(c) Both of these

(d) None of these

2. Attempt all parts:-

2.a.	Define term "Soft computing". (CO1)	2
2.b.	Define term the Perceptron. (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.	Discuss the need of Mutation in Genetic Algorithm. (CO5)	2

SECTION B **30**

3. Answer any <u>five</u> 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. (CO1)	6
3-c.	Explain (1) binary sigmoidal activation function, (2) bipolar sigmoidal activation function (CO2)	6
3-d.	Calculate the net input for x1=0.2, x2=0.6, and bias b=1 with weight 0.3.Assume w1=w2=1. (CO2)	6
3.e.	Consider fuzzy sets Ã and B defined on the interval X = [0,5] of real number by the membership grade functions : (CO3) $\mu_A(X) = X/X+1$, $\mu_B(X) = 2-X$ Determine the mathematical formulas and graphs of the membership grade functions for following set: i) A^c, B^c ii) A U B iii) $A \cap B$	6
3.f.	Define fuzzy logic and its importance in our daily life. What is role of crisp sets in fuzzy logic ? (CO4)	6
3.g.	Compare Roulette-Wheel Selection method with Rank Selection Method. (CO5)	6

SECTION C **50**

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

4-a.	Draw the Structure of a Biological Neuron and explain in detail. (CO1)	10
4-b.	Discuss the role of MATLAB Environment for Soft Computing Techniques.	10

(CO1)

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

5-a. Calculate the Output of Neural Network for the inputs x1=0.3, x2 = 0.4 and bias b=1 with weight of 0.3 for bipolar activation function. Assume w1=w2=1 . (CO2) 10

5-b. Explain Artificial Neural Network . Discuss Single layer and Multilayer ANN systems with the help of diagram. (CO2) 10

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

6-a. What is fuzzy set theory ? Explain different fuzzy sets and its operations. (CO3) 10

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

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

7-a. Explain fuzzy connectives like Negation, Disjunction, Conjunction, and Implication. (CO4) 10

7-b. Explain membership function in fuzzy logic. Explain the fuzzy inference in detail with suitable Example. (CO4) 10

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. Define the terms chromosome, fitness function, crossover and mutation as used in genetic algorithms. (CO5) 10