Printed Page:-03 Subject Code:- BEC0304

Roll. No:

NOIDA INSTITUTE OF ENGINEERING AND TECHNOLOGY, GREATER NOIDA

(An Autonomous Institute Affiliated to AKTU, Lucknow)

B.Tech

SEM: III - THEORY EXAMINATION (2024 - 2025)

Subject: Computational Intelligence

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. A computational intelligence system can be best described as: (CO1,K1) 1

(a) A system that relies on a fixed set of rules to solve problems

(b) A system capable of reasoning, learning, and adapting

(c) A purely random decision-making system

(d) A system that only works on binary data

1-b. The need of biological neural networks is- (CO1,K1) 1

(a) to solve tasks like machine vision & natural language processing

(b) to apply heuristic search methods to find solutions of problem

(c) to make smart human interactive & user friendly system

(d) all of the mentioned

1-c. What is the primary purpose of the activation function in a neural network? (CO2,K2) 1

(a) To adjust weights of connections

(b) To introduce non-linearity to the model

(c) To initialize the network

(d) To perform data normalization

1-d. What is the process of updating weights in a neural network called? (CO2, K3) 1

(a) Backpropagation

(b) Forward propagation

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(c) Activation

(d) Normalization

1-e. Fuzzy logic uses- (CO3, K2) 1

(a) Global variables

(b) Linguistic variables

(c) Local variables

(d) Approximate variables

1-f. The values of the set membership is represented by- (CO3, K2) 1

(a) Discrete Set

(b) Degree of truth

(c) Probabilities

(d) Both Degree of truth & Probabilities

1-g. Which of the following is NOT a commonly used defuzzification method? (CO4, K3) 1

(a) Centroid of Area (CoA)

(b) Mean of Maximum (MoM)

(c) Weighted Average (WA)

(d) Product of Minimum (PoM)

1-h. What is the main purpose of a Fuzzy Logic Controller? (CO4, K3) 1

(a) To work with binary systems only

(b) To control systems based on fuzzy set theory

(c) To replace neural networks

(d) To use only crisp inputs and outputs

1-i. In a genetic algorithm, what does "crossover" refer to? (CO5, K1) 1

(a) Random changes to a solution

(b) Combining parts of two parent solutions to produce offspring

(c) Selecting the best solution for reproduction

(d) Sorting solutions in order of fitness

1-j. Genetic Algorithms are: (CO5, K2) 1

(a) a part of Evolutionary Computing

(b) inspired by Darwin's theory about evolution - "survival of the fittest"

(c) adaptive heuristic search algorithm based on the evolutionary ideas of natural selection and genetics

(d) All of the above

2. Attempt all parts:-

2.a. Define Hard computing. (CO1, K1) 2

2.b. Explain binary sigmoidal activation function. (CO2, K1) 2

2.c. Evaluate power of given fuzzy set: A={(x1,0.4),(x2,0.2),(x3,0.7)}. (CO3, K2) 2

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2.d.	Write and explain characteristics of fuzzy sets. (CO4, K1)	2
2.e.	Explain various bit-Wise Operator Used in GA. (CO5, K2)	2

SECTION-B 30

3. Answer any five of the following:-

3-a.	Describe the Various types of Computational Intelligence Techniques. (CO1, K1)	6
3-b.	Compare physical neuron and artificial neuron. (CO1, K1)	6
3-c.	Write short note on Multilayer ANN systems. (CO2, K1)	6
3-d.	Calculate the net input for x1=0.4, x2=0.3, and bias b=1 with fixed weight of 0.3 for every input. (CO2, K3)	6
3.e.	Define crisp logic? Explain operations of crisp logic relations. (CO3, K2)	6
3.f.	Define defuzzification and explain the different defuzzification methods. (CO4, K3)	6
3.g.	Explain three reproduction operators used in GA. (CO5, K2)	6

SECTION-C 50

4. Answer any one of the following:-

4-a.	Explain the applications of computational intelligence in various fields. (CO1, K1)	10
4-b.	Explain computational intelligence. Compare soft computing vs. hard computing. Explain various characteristics of CI techniques. (CO1, K1)	10

5. Answer any one of the following:-

5-a.	Describe Adaline and Madaline networks in detail. (CO2, K3)	10
5-b.	Define an artificial neural network. State the characteristics of an artificial neural network. (CO2, K2)	10

6. Answer any one of the following:-

6-a.	Explain the different operations used in Fuzzy relations. (CO3, K2)	10
6-b.	Name and explain different fuzzy membership functions with a diagram. (CO3, K2)	10

7. Answer any one of the following:-

7-a.	Describe fuzzification. Briefly explain fuzzy logic controller. (CO4, K3)	10
7-b.	Explain Centre of gravity method of defuzzification. (CO4, K2)	10

8. Answer any one of the following:-

8-a.	Explain about the mutation and basic operators in genetic algorithms. (CO5, K2)	10
8-b.	Enumerate steps followed by GA with the help of flowchart. (CO5, K4)	10

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