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Printed Page:-4 **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 (2025 - 2026)
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. Core of soft Computing is ..... (CO1, K1) 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-b. The need of biological neural networks is- (CO1, K2) 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. In artificial Neural Network, interconnected processing elements are called ..... (CO2, K2) 1

(a) nodes or neurons
(b) weights
(c) axons
(d) Soma

1-d. What is full form of ANNs? (CO2, K1) 1

(a) Artificial Neural Networks
(b) Artificial Neural numbers
(c) Artificial Neural Node
(d) none of the mentioned

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1-e. Which of the following can be stated using fuzzy logic? (CO3, K2) 1

(a) Color of an apple
(b) Height of a person
(c) Date of birth of a student
(d) Speed of a car

1-f. The truth values of traditional set theory is …… (CO3, K3) 1

(a) Either 0 or 1
(b) Between 0 and 1
(c) 0.5
(d) 0.9

1-g. Which of the following is not true regarding the principles of fuzzy logic ? (CO4, K1) 1

(a) Fuzzy logic is a concept of `certain degree.
(b) Fuzzy logic follows the principle of Aristotle and Buddha.
(c) Japan is currently the most active users of fuzzy logic.
(d) Boolean logic is a subset of fuzzy logic.

1-h. Which type of rule is used in a Fuzzy Logic Controller? (CO4, K1) 1

(a) Linear equations
(b) If-Then rules
(c) Matrix algebra
(d) Proportional gain formulas

1-i. What is the role of mutation in a genetic algorithm? (CO5, K1) 1

(a) Eliminate unfit solutions
(b) Create diversity by randomly altering genes
(c) Combine two parents into offspring
(d) Measure the fitness of a solution

1-j. Which of the following is NOT a component of a genetic algorithm? (CO5, K3) 1

(a) Selection
(b) Mutation
(c) Inheritance
(d) Compilation

2. Attempt all parts:-

2.a. Describe term Soft computing. (CO1, K2) 2

2.b. What do you mean by Linear function in ANN? (CO2, K2) 2

2.c. Compare and Contrast about Crisp Logic and Fuzzy Logic. (CO3, K3) 2

2.d. Given two fuzzy set A and B,A={(1, 0.5), (2, 0.1), (3, 0.4)} and B={(1, 0.2), (2, 0.3), (3, 0.5)}. Find union of the two sets. (CO4, K4) 2

2.e. Explain various bit-Wise Operator Used in GA. (CO5, K2) 2

SECTION-B 30

3. Attempt all parts:-

3.a. Answer any one of the following:-

3.a.(i)	Explain about the Applications of ANN in detail. (CO1, K2)	6
3.a.(ii)	Describe the Various types of Computational Intelligence Techniques. (CO1, K1)	6

3.b. Answer any one of the following:-

3.b.(i)	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.b.(ii)	Explain the architecture of ANN model. (CO2, K1)	6

3.c. Answer any one of the following:-

3.c.(i)	A = {(x1,0.7),(x2,0.3),(x3,0.2),(x4,0.1)}, B = {(x1,0.6),(x2,0.5),(x3,0.6),(x4,0.2)} Calculate the several operation of the fuzzy set. (CO3, K2)	6
3.c.(ii)	Analyze fuzzy set theory in detail. (CO3, K4)	6

3.d. Answer any one of the following:-

3.d.(i)	Define Fuzzification and Defuzzification with example. (CO4, K2)	6
3.d.(ii)	Apply the fuzzy controller technique for “AC controller using Fuzzy logic controller” in a brief manner. (CO4, K3)	6

3.e. Answer any one of the following:-

3.e.(i)	What are the basic operators of genetic algorithm? (CO5, K2)	6
3.e.(ii)	Illustrate with suitable examples the two main cross over operations used in GA. (CO5, K3)	6

SECTION-C 50

4. Answer any one of the following:-

4-a.	What are the constraints which are need to consider while designing a feed forward net for a specific application. (CO1, K2)	10
4-b.	Elaborate the various characteristics of computational intelligence. (CO1, K2)	10

5. Answer any one of the following:-

5-a.	Differentiate between Biological Neural Networks and Artificial neural network. (CO2, K3)	10
5-b.	Explain Artificial Neural Network . Discuss Single layer and Multilayer ANN systems with the help of diagram. (CO2, K3)	10

6. Answer any one of the following:-

6-a.	Explain cartesian product operation. If there are two sets with values A = {(x1,0.5),(x2,0.1),(x3,0.4)}, B = {(y1,0.2),(y2,0.3),(y3,0.5)} then, calculate AXB relation matrix. (CO3, K2)	10
6-b.	Explain various types of membership functions in detail. (CO3, K2)	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, let us consider the following. A = {(x1, 0.5),(x2, 1),(x3, 0.6)} B = {(y1, 1),(y2, 0.4)} Then, given a fact expressed by the proposition x is A’ , where A’ = {(x1, 0.6),(x2, 0.9),(x3, 0.7)} derive a conclusion in the form y is B’ (using generalized modus ponens (GMP)). (CO4, K3)	10
7-b.	Explain Centre of gravity method of defuzzification. (CO4, K2)	10

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

8-a.	Enumerate steps followed by GA with the help of flowchart. (CO5, K4)	10
8-b.	List and Explain in brief various Selection methods of Reproduction in GA. (CO5, K4)	10