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BTECH
(SEM IV) THEORY EXAMINATION 2021-22
INTRODUCTION TO SOFT COMPUTING

Time: 3 Hours**Total Marks: 100****Note:** Attempt all Sections. If you require any missing data, then choose suitably.**SECTION A****1. Attempt all questions in brief.****2x10 = 20**

Qno	Questions	CO
(a)	Explain the differences between artificial and biological neurons.	1
(b)	What is soft computing? What distinguishes it from traditional computing?	1
(c)	What are some examples of fuzzy logic's applications?	2
(d)	Distinguish between crisp and fuzzy sets.	2
(e)	What is defuzzification and why is it required? Explain mean of maxima and center of sum method.	3
(f)	Differentiate between probability theory and Fuzzy set theory.	3
(g)	How do genetic algorithms perform more effectively than conventional methods?	4
(h)	Explain genetic algorithms' Roulette Wheel Selection in a few words.	4
(i)	What is crossover in genetic algorithm.	5
(j)	What is the use of mutation in genetic algorithm?	5

SECTION B**2. Attempt any three of the following:****10x3 = 30**

Qno	Questions	CO
(a)	Describe artificial neural network multilayer perceptron model.	1
(b)	Let A and B be two fuzzy sets given by A: $\{(x_1, 0.2), (x_2, 0.5), (x_3, 0.6)\}$; B: $\{(x_1, 0.1), (x_2, 0.4), (x_3, 0.5)\}$. Find $(A-B)^2$.	2
(c)	What will the input and output be for an air conditioner in a fuzzy controller?	3
(d)	Define the generation cycle. Describe the various applications of genetic algorithms.	4
(e)	How soft computing can be used in internet search techniques? Explain with suitable example.	5

SECTION C**3. Attempt any one part of the following:****10x1 = 10**

Qno	Questions	CO
(a)	Explain the Hopfield network with an example.	1
(b)	Discuss about the supervised learning strategy.	1

4. Attempt any one part of the following:**10x1 = 10**

Qno	Questions	CO
(a)	Give reasons for using fuzzy logic in AI. List a few examples from the world of industry where fuzzy logic is utilized for control.	2
(b)	Let $X = \{a, b, c, d\}$ $Y = \{1, 2, 3, 4\}$ And the three fuzzy sets be given as: Fuzzy set A = $\{(a, 0), (b, 0.8), (c, 0.6), (d, 1)\}$ Fuzzy set B = $\{(1, 0.2), (2, 1), (3, 0.8), (4, 0)\}$ Fuzzy set C = $\{(1, 0), (2, 0.4), (3, 1), (4, 0.8)\}$ Calculate the implication relation i IF x is Fuzzy set A THEN y is Fuzzy set B ii IF x is Fuzzy set A THEN y is Fuzzy set B ELSE y is Fuzzy set C.	2



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5. Attempt any *one* part of the following: **10x1 = 10**

Qno	Questions	CO
(a)	Two fuzzy sets I and F are defined as: $I = \{(F,0.4), (E,0.3), (X,0.1), (Y,0.1), (I,0.9), (T,0.8)\}$ $F = \{(F,0.99), (E,0.8), (X,0.1), (Y,0.2), (I,0.5), (T,0.5)\}$ Determine the following: i.) Fuzzy set I – Fuzzy set F ii.) Verify (De Morgan's Law) following: Complement of (Fuzzy set I \cup Fuzzy set F) = (Complement of Fuzzy set I) \cap (Complement of Fuzzy set F)	3
(b)	Illustrate various defuzzification methods in details.	3

6. Attempt any *one* part of the following: **10x1 = 10**

Qno	Questions	CO
(a)	Explain rank selection and Roulette wheel selection methods.	4
(b)	What exactly do genetic bitwise operators do? Explain.	4

7. Attempt any *one* part of the following: **10x1 = 10**

Qno	Questions	CO
(a)	Propose a solution to travelling salesman problem using genetic algorithm.	5
(b)	What two requirements should a problem satisfy in order to be suitable for solving it by a GA?	5