Printed Page:-03 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 (2024-2025) 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. 2024 **SECTION-A** 20 1. Attempt all parts:-1-a. Core of soft Computing is (CO1,K1) 1 Fuzzy Computing, Neural Computing, Genetic Algorithms (a) Fuzzy Networks and Artificial Intelligence (b) (c) Artificial Intelligence and Neural Science Neural Science and Genetic Science (d) The auto-association task in neural network is (CO1,K2) 1-b. 1 find relation between 2 consecutive inputs (a) (b) related to storage & recall task predicting the future inputs (c) None of the mentioned (d) 1-c. A perceptron can be defined as _____. (CO2,K1) 1 A double layer auto-associative neural network (a) A neural network with feedback (b) An auto-associative neural network (c) (d) A single layer feed-forward neural network with pre-processing What is the name of the network, which includes backward links from the output 1-d. 1 to the inputs as well as the hidden layers? (CO2,K1) (a) Perceptron Self-organizing maps (b)

	(c)	Multi-layered perceptron	
	(d)	Recurrent neural network	
1-e.	Which one cannot be stated using fuzzy logic? (CO3,K2)		
	(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 membership functions are generally represented in (CO3,K1)		1
	(a)	Tabular Form	
	(b)	Graphical Form	
	(c)	Mathematical Form	
	(d)	Logical Form	
1-g.	Which of the following is associated with fuzzy logic? (CO4,K2)		
	(a)	Crisp set logic	
	(b)	Many-valued logic	
	(c)	Two-valued logic	
	(d)	Binary set logic	
1-h.	If x is A then y is B else y is C the output of the given fuzzy rule is: (CO4,K3)		
	(a)	a fuzzy set	
	(b)	a crisp set	
	(c)	a fuzzy relation	
	(d)	a membership function	
1-i.	If 5,	the parent solutions are 1110111 and 1010101 and if the crossover site is which of the following indicates one of the new offspring? (CO5,K3)	1
	(a)	1110101	
	(b)	1110011	
	(c)	1010001	
	(d)	1110110	
1-j.	Matrix Crossover is based on (CO5,K1)		
	(a)	One dimensional crossover	
	(b)	Two dimensional crossover	
	(c)	N dimensional crossover	
	(d)	none	
2. Att	empt a	all parts:-	
2.a.	D	efine Intelligence in short. (CO1,K1)	2
2.b.	E	xplain binary sigmoidal activation function. (CO2,K2)	2
2.c.	C D	onsider Two fuzzy sets A1= $0.2/x1+0.9/x2$ and A2= $0.3/y1+0.5/y2+1/y3$. etermine the A1-A2. (CO3,K3)	2

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2.d.	Define Fuzzy Inference Systems. (CO4,K1)	2
2.e.	State Binary Encoding in Genetic Algorithm. (CO5,K1)	2
<u>SECTIO</u>	<u>N-B</u>	30
3. Answe	r any <u>five</u> of the following:-	
3-a.	Write the short note on biological neurons.(CO1,K1)	6
3-b.	Draw the model of a single artificial neuron and derive its output. (CO1,K2)	6
3-с.	Write the difference between Supervised and Unsupervised Learning. (CO2,K4)	6
3-d.	How many types of the artificial neural network used in machine learning? Explain any two in brief? (CO2,K2)	6
3.e.	A = { $(x1,0.5),(x2,0.1),(x3,0.4)$ }, B = { $(x1,0.2),(x2,0.3),(x3,0.5)$ } Calculate the Disjunctive sum of the fuzzy set. (CO3,K4)	6
3.f.	Explain the process of fuzzification and defuzzification process for AC controller. (CO4,K2)	6
3.g.	Draw and Discuss the Flow Chart of Genetic Algorithm. (CO5,K2)	6
SECTIO	<u>N-C</u>	50
4. Answe	r any <u>one</u> of the following:-	
4-a.	What is an expert system? What are the characteristics of an expert system? (CO1,K2)	10
4-b.	Explain why soft computing is able to solve the problems in which the conventional hard computing techniques are inadequate. (CO1,K2)	10
5. Answe	r 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,K3)	10
5-b.	Write difference between Adaline and Madaline approaches in ANN. (CO2,K4)	10
6. Answe	r any <u>one</u> of the following:-	
6-a.	What are the various Fuzzy Logic used in neural networks? Discuss each of them in detail. (CO3,K2)	10
6-b.	Describe Fuzzy relation and explain its various operations. (CO3,K2)	10
7. Answe	r any <u>one</u> of the following:-	
7-a.	Differentiate between Predicate logic and Fuzzy Logic. (CO4,K4)	10
7-b.	Explain membership function in fuzzy logic. Explain the fuzzy inference in detail with suitable Example. (CO4,K2)	10
8. Answe	r any <u>one</u> of the following:-	
8-a.	Define the terms chromosome, fitness function, crossover and mutation as used in genetic algorithms. (CO5,K2)	10
8-b.	Illustrate the basic operations and different technologies adopted in genetic algorithm (GA). (CO5,K2)	10

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