Enrollment No./Seat No.:

GUJARAT TECHNOLOGICAL UNIVERSITY

Bachelor of Engineering - SEMESTER - VI EXAMINATION - SUMMER 2025

Subject Code: 3160619 **Date: 26-05-2025**

Subject Name: Soft Computing Techniques

Time: 10:30 AM TO 01:00 PM **Total Marks: 70**

Instructions

1. **Attempt all questions.**
2. **Make suitable assumptions wherever necessary.**
3. **Figures to the right indicate full marks.**
4. **Simple and non-programmable scientific calculators are allowed.**

			Marks
Q.1	**(a)**	Define Soft Computing. Enlist Various Soft Computing.	**03**
	(b)	Explain concept of Neural networks and the various types of learning.	**04**
	(c)	Differentiate between Hard Computing and Soft Computing with examples.	**07**
Q.2	**(a)**	What is Fuzzy logic.	**03**
	(b)	Explain the significance of Fuzzy Logic and Fuzzy Sets in detail.	**04**
	(c)	What is membership function? Draw the various membership functions of fuzzy sets with a suitable mathematical formula.	**07**
		OR	
	(c)	Define with examples (1) Fuzzy Sets, (2) Grade ship function, (3) Fuzzy Rules (If else rules).	**07**
Q.3	**(a)**	What is meant by Genetic Algorithm?	**03**
	(b)	Draw the framework of GA.	**04**
	(c)	Discuss applications of ANN to solve engineering and technical problems.	**07**
		OR	
	(a)	Explain Genetic Algorithm with examples.	**03**
	(b)	What are the applications of GA in civil engineering?	**04**
	(c)	What are the advantages and drawbacks of ANN, provide comparative analysis.	**07**
Q.4	**(a)**	Write a short note on Mamdani or Sugeno FIS for the formation of inference rules.	**03**
	(b)	List different types of activation functions used in ANN's.	**04**
	(c)	What are the different defuzzification techniques using in Fuzzy Rationale?	**07**
		OR	
	(a)	What is meant by Crossover and Mutation.	**03**
	(b)	What is meant by Selection and Encoding. Explain with help of examples in reference with Genetic Algorithm.	**04**

	(c)	What is the basic framework of fuzzy logic. Draw the ANN architectures.	**07**
Q.5	**(a)**	What is Hybrid Computing Technique.	**03**
	(b)	How does hybrid computing can be used in technical analysis.	**04**
	(c)	Describe Fuzzy Neural (Neuro-Fuzzy) System. Explain with the help of example.	**07**

OR

	(a)	Explain genetic-neural system (Neuro-Genetic) in detail.	**03**
	(b)	How genetic neural system is helpful in engineering solutions	**04**
	(c)	Explain various applications of Hybrid and soft computing techniques.	**07**

***

Enrolment No./Seat No_____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–VI (NEW) EXAMINATION – SUMMER 2024

Subject Code:3160619 Date:20-05-2024

Subject Name:Soft Computing Techniques

Time:10:30 AM TO 01:00 PM Total Marks:70

Instructions:

1. **Attempt all questions.**
2. **Make suitable assumptions wherever necessary.**
3. **Figures to the right indicate full marks.**
4. **Simple and non-programmable scientific calculators are allowed.**

			MARKS
Q.1	**(a)**	What do you understand by soft computing? Explain its characteristics.	**03**
	(b)	What is fuzzy logic? How is it different from binary logic?	**04**
	(c)	Write a detailed note on applications of soft computing	**07**
Q.2	**(a)**	Write a short note on fuzzy expert systems.	**03**
	(b)	Enlist and explain the properties of fuzzy sets	**04**
	(c)	Explain Defuzzification. Classify the different methods of defuzzification process.	**07**
		OR	
	(c)	Explain fuzzy inference. Describe the types of procedures used in fuzzy inference.	**07**
Q.3	**(a)**	Sketch the flowchart of Genetic algorithm	**03**
	(b)	Explain Mamdani's and Zadeh's interpretation of fuzzy rule.	**04**
	(c)	Write a note on: (i) Tournament selection (ii) Chromosomes	**07**
		OR	
Q.3	**(a)**	Explain the major components of Genetic Algorithm.	**03**
	(b)	Explain bit-wise operation in genetic algorithm.	**04**
	(c)	Define crossover? Explain different types of crossover techniques.	**07**
Q.4	**(a)**	Write a short note on character recognition using ANN.	**03**
	(b)	Define Encoding in Genetic algorithm. Describe the different encoding methods.	**04**
	(c)	Explain the working of a Back propagation neural network with a neat architecture.	**07**
		OR	
Q.4	**(a)**	Differentiate between supervised learning and unsupervised learning.	**03**
	(b)	Explain Hebbian learning with its flowchart.	**04**
	(c)	Define perceptron. Explain the learning rule of perceptron.	**07**

Q.5	**(a)**	Write the advantages of Genetic fuzzy hybrids.	**03**
	(b)	Elaborate Adaline network. Also discuss the applications of the Adaline network	**04**
	(c)	What is a neuro-fuzzy system? In which areas neuro fuzzy systems are useful?	**07**

OR

Q.5	**(a)**	Write the characteristics of Neuro genetic hybrids.	**03**
	(b)	List few applications of hybrid Fuzzy genetic algorithm systems.	**04**
	(c)	With suitable block diagram, explain the principle involved in a liquid level controller using neuro fuzzy technique.	**07**

****

Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–VI (NEW) EXAMINATION – SUMMER 2023

Subject Code:3160619 Date:10-07-2023

Subject Name:Soft Computing Techniques

Time:10:30 AM TO 01:00 PM Total Marks:70

Instructions:

1. **Attempt all questions.**
2. **Make suitable assumptions wherever necessary.**
3. **Figures to the right indicate full marks.**
4. **Simple and non-programmable scientific calculators are allowed.**

			MARKS
Q.1	**(a)**	What are the different fuzzy sets? Define them	**03**
	(b)	What is soft computing? How it differs from hard computing?	**04**
	(c)	Discuss the characteristics and applications of soft computing techniques.	**07**
Q.2	**(a)**	What are the roles of α-cut in fuzzy set theory?	**03**
	(b)	Explain the evolution phases of Fuzzy logic	**04**
	(c)	Explain the fuzzy inference with suitable Example	**07**
		OR	
	(c)	What are the various defuzzification methods? Explain them.	**07**
Q.3	**(a)**	What are the basic Genetic Algorithm Operators?	**03**
	(b)	Compare non-fuzzy logic and fuzzy logic approaches	**04**
	(c)	Write Short note on: (i) Convergence of GA (ii) Multi-Level Optimization	**07**
		OR	
Q.3	**(a)**	How do you select mutation in GA?	**03**
	(b)	How is Genetic Algorithm differing from traditional algorithm?	**04**
	(c)	What is Roulette wheel selection in GA? Explain in detail.	**07**
Q.4	**(a)**	Distinguish between supervised learning and unsupervised learning.	**03**
	(b)	What is Rank selection in GA? Explain in brief.	**04**
	(c)	Why activation function is used in artificial neuron? Explain different activation functions.	**07**
		OR	
Q.4	**(a)**	Distinguish between artificial neuron & biological neuron	**03**
	(b)	Explain the taxonomy of artificial neural network architectures.	**04**
	(c)	With neat sketch, differentiate multilayer feed forward networks and recurrent neural networks.	**07**
Q.5	**(a)**	What do you mean by hybrid systems? Enlist various hybrid systems and give brief explanation.	**03**
	(b)	Sketch the architecture of Boltzmann network and mention the steps for recall Procedure.	**04**
	(c)	Draw and explain models of Neuro Fuzzy System.	**07**
		OR	
Q.5	**(a)**	Write the comparisons between fuzzy systems and neural network.	**03**
	(b)	Write and explain applications of Neuro Fuzzy System.	**04**
	(c)	Define and explain fuzzy-Genetic hybrid Systems.	**07**

****

Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–VI (NEW) EXAMINATION – SUMMER 2022

Subject Code:3160619 Date:06/06/2022

Subject Name:Soft Computing Techniques

Time:10:30 AM TO 01:00 PM Total Marks: 70

Instructions:

1. **Attempt all questions.**
2. **Make suitable assumptions wherever necessary.**
3. **Figures to the right indicate full marks.**
4. **Simple and non-programmable scientific calculators are allowed.**

			MARKS
Q.1	**(a)**	Differentiate "Soft" computing versus "Hard" computing.	**03**
	(b)	What is fuzzy set and membership function?.	**04**
	(c)	Describe characteristics of soft computing and give any two example of soft computing in civil engineering.	**07**
Q.2	**(a)**	Define support, core and normality terminology.	**03**
	(b)	Explain union and intersection operation with example.	**04**
	(c)	Explain application of fuzzy logic in civil engineering and day to day practice.	**07**
		OR	
	(c)	Give crisp set A ={1,2,3,4} find the relation matrix for the relation R= {(a,b)/b=a+1, a,b ∈ A } and S= {(a,b)/b=a+2, a,b ∈ A } and also find R U S , R∩S , compliment of R.	**07**
Q.3	**(a)**	Define genetic algorithm and its application.	**03**
	(b)	What is defuzzification and enlist different defuzzification Techniques?	**04**
	(c)	Derive R·S (max. min. composition) for x and y = {1,3,5} and relation matrix R={(x,y)/ y=(x+2)}, S={(x,y)/ x<y} here R and S is x * y.	**07**
		OR	
Q.3	**(a)**	Explain basic GA. Framework.	**03**
	(b)	Enlist simple genetic algorithm parameter and its features.	**04**
	(c)	Determine a fitness value of a function $f(x,y) = (x-6)^2 + (y-3)^2$ for a string 110010,000100,100001 having string length of first 3 bits for X and remaining 3 bits are for Y.	**07**
Q.4	**(a)**	Differentiate artificial neural network and biological neural network.	**03**
	(b)	Describe biological and it's working.	**04**
	(c)	Explain crossover and mutation in detail	**07**
		OR	
Q.4	**(a)**	Explain chromosomes ,gene, and allele in brief.	**03**
	(b)	Enlist the step for solving problem using GA in MATLAB.	**04**
	(c)	Explain different ANN architectures.	**07**
Q.5	**(a)**	Explain ANN and enlist the element of neural network.	**03**
	(b)	What are the advantages of hybrid systems?	**04**
	(c)	Explain genetic neural system in detail.	**07**
		OR	
Q.5	**(a)**	What do you mean by hybrid system in Soft computing	**03**
	(b)	Give the advantages of ANN.	**04**
	(c)	Describe fuzzy neural system with its working flow advantages and disadvantages.	**07**

****