Reg. No.															

B.Tech. DEGREE EXAMINATION, NOVEMBER 2023

Sixth Semester

18CSE389T – FUZZY LOGIC AND ITS APPLICATIONS

(For the candidates admitted from the academic year 2020-2021 & 2021-2022)

Note:

(i) **Part - A** should be answered in OMR sheet within first 40 minutes and OMR sheet should be handed over to hall invigilator at the end of 40th minute.

(ii) **Part - B & Part - C** should be answered in answer booklet.

Time: 3 hours | Max. Marks: 100

	Marks	BL	CO	PO

PART – A (20 × 1 = 20 Marks)

Answer **ALL** Questions

1. Which of the following logic is a form of fuzzy logic? | 1 | 1 | 1 | 1
   (A) Two valued logic (B) Many valued logic
   (C) Crisp set logic (D) Binary set logic

2. The values of set membership is represented by | 1 | 1 | 1 | 1
   (A) Discrete set (B) Degree of truth
   (C) Probabilities (D) Both degree of truth and probabilities

3. The value $\mu_A(x) = 1$ is | 1 | 1 | 1 | 1
   (A) Core (B) Support
   (C) Boundary (D) Support and boundary

4. The relation A is | 1 | 1 | 1 | 1

$$A = \begin{bmatrix} 1 & 0.2 & 0.3 \\ 0.3 & 1 & 0.4 \\ 0.2 & 0.2 & 1 \end{bmatrix}$$

   (A) Symmetric (B) Transitive
   (C) Reflexive (D) Reflexive and symmetric

5. Select correct answer | 1 | 2 | 2 | 1
   Statement 1 : Divisive clustering belongs to hierarchical clustering
   Statement 2: A cluster data point cannot be a data point of other clusters
   (A) Statement 1 and statement 2 are true (B) Statement 1 and statement 2 are false
   (C) Statement 1 is true and statement 2 is false (D) Statement 1 is false and statement 2 is true

6. Which of the following method is used for recommendation system? | 1 | 2 | 2 | 2
   (i) Classification (ii) Clustering
   (iii) Reinforcement learning (iv) Regression
   (A) (i) and (ii) (B) (ii) and (iii)
   (C) (i), (ii) and (iv) (D) (i) and (iv)

7. To handle noise in data regression finds the 1 1 2 1
   (A) Best fit line (B) Unfit line
   (C) Bins (D) Overfit line

8. Back propagation is 1 1 2 1
   (A) Curvy function (B) Transmission of error back through network to allow weights to be adjusted
   (C) It adjust input (D) Transmission of signal

9. Assume a data point (DP1) lies on both cluster C_1 and C_2. This type of cluster is called 1 1 3 1
   (A) Hard cluster (B) Soft cluster
   (C) Normal cluster (D) Multi cluster

10. Which of the following cluster identifies ellipsoid cluster? 1 1 3 1
   (A) K-means cluster (B) DBscan cluster
   (C) Fuzzy C-means cluster (D) Gustafson Kessel cluster

11. Which of the following algorithm is used to find the line segment 1 1 3 1
   (A) Adaptive fuzzy clustering (B) Fuzzy k-means clustering
   (C) C-means clustering (D) Type clustering

12. Choose the correct option 1 1 3 1
   (i) Gath Geva recognize lines
   (ii) Gustafson - Kessel can vary the cluster size
   (A) (i) and (ii) are true (B) (i) and (ii) are false
   (C) (i) is true and (ii) is false (D) (i) is false and (ii) are true

13. The rule that shifts the focus away from the worst case into the best case 1 1 4 1
   (A) Union (B) Intersection
   (C) Complement (D) Product

14. Which function in input case returns the integer in the range zero through nclasses-1 that signifies the chose nclass 1 2 4 1
   (A) Reduce ( ) (B) Merge ( )
   (C) Classify ( ) (D) Cluster ( )

15. The _____ relationship between output and input is an internet property of fuzzy system. 1 1 4 1
   (A) Pair relationship (B) Coupling relationship
   (C) Addictive relationship (D) Monotonic relationship

16. Which of the following methods best fit the data in logistic regression? 1 1 4 1
   (A) Least square error (B) Maximum linkelihood
   (C) Jacaard distance (D) Both (A) and (B)

17. What is odds ratio? 1 1 5 1
   (A) Probability of an event occurring (B) Probability of an event not occurring
   (C) Probability of an event occurring to not occurring (D) Probability of an event not occurring to occurring

18.	In ANFIS the output of layer 3 is (A) Binary value (B) Normalized firing strength (C) Defuzzified value (D) Consequent parameter	1	2	5	2
19.	RBFN stands for (A) Radial basis function network (B) Radial basis frequency network (C) Radial bias function network (D) Radial bias frequency network	1	1	5	1
20.	In conventional fuzzy inference system the number of rules is determined by (A) Previous analysis (B) Trial and error method (C) Model analysis method (D) Target system model	1	2	5	2

	Marks	BL	CO	PO

PART – B (5 × 4 = 20 Marks)

Answer **ANY FIVE** Questions

21.	Find the max-max composition of the given fuzzy set $\underset{\sim}{A} = \left\{\frac{1.0}{x_1} + \frac{0.3}{x_2} + \frac{0.4}{x_3} + \frac{0.8}{x_4}\right\}$, $\underset{\sim}{B} = \left\{\frac{0.8}{y_1} + \frac{0.7}{y_2} + \frac{0.2}{y_3} + \frac{0.6}{y_4}\right\}$, $\underset{\sim}{C} = \left\{\frac{0.2}{z_1} + \frac{0.1}{z_2} + \frac{0.5}{z_3} + \frac{0.7}{z_4}\right\}$, Where, $R = A \times B$, $S = B \times C$	4	4	1	2
22.	Explain crisp logic and fuzzy logic, give real-life example for each.	4	3	1	1
23.	What is machine learning? List and explain its types.	4	2	2	1
24.	Explain about perceptron with an example.	4	1	2	1
25.	Compare soft cluster and hard cluster.	4	2	3	1
26.	Which rule is more suitable for information discard? Write it briefly.	4	3	4	2
27.	Explain the uses of ANFIS.	4	1	5	1

	Marks	BL	CO	PO

PART – C (5 × 12 = 60 Marks)

Answer **ALL** Questions

28. a.i.	What are all the features of membership function? Explain it with neat diagram.	6	4	1	1
ii.	Explain the LAMBDA-cut method of defuzzification of crisp sets. Give example.	6	2	1	1
	(OR)				
b.	Explain in detail about the composition method with example.	12	3	1	2

29. a. Find the cluster for following data point using single link technique. Use Euclidean distance and draw a dendrogram. | 12 | 4 | 2 | 4 |

	x	y
p_1	0.40	0.53
p_2	0.22	0.38
p_3	0.08	0.41
p_4	0.45	0.30

(OR)

b. Explain about K-means clustering discuss it merits and demerits. | 12 | 2 | 2 | 4 |

30. a. What are all the merits of fuzzy based clustering? Compare it with normal clustering algorithm. | 12 | 4 | 3 | 1 |

(OR)

b. Explain in detail about any two soft clusters which detect ellipsoid clusters. | 12 | 4 | 3 | 1 |

31. a. Discus intersection and union rules required by a component model for building a Neuro fuzzy system. | 12 | 4 | 4 | 4 |

(OR)

b.i. Maximizing the fuzzy integral results in positive (or) negative way? What condition is used to measure it? | 8 | 4 | 4 | 1 |

ii. Define the pairwise coupling and writes its importance. | 4 | 2 | 4 | 1 |

32. a. Explain the layers of ANFIS in detail with neat diagram. | 12 | 4 | 5 | 1 |

(OR)

b.i. What is hybrid algorithm? Explain it. | 6 | 2 | 5 | 1 |

ii. The product of the output of two fuzzy inference is expressed by which algebric closure? Explain it. | 6 | 4 | 6 | 4 |

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