b.i.	Explain in detail about the network of McCullosh-Pitts neurons with a diagram.	6	2	1	1
ii.	Mention about the general procedure to be followed in building ANNs.	6	2	1	1
29. a.	Explain about how would the back propagation algorithm performs the adjustment of the interconnection weights during the learning process.	12	3	2	2
	(OR)				
b.i.	Write notes on multi-layer Feed Forward Net Activation Function.	6	2	2	2
ii.	Describe about the input vector, output nodes and the training of RBF network with necessary diagram.	6	3	2	2
30. a.	Discuss in detail about the composition operation on crisp set relations.	12	3	3	2
	(OR)				
b.	Illustrate about some of the useful transformations that can be applied to fuzzy membership functions. Note: Use your own scenario to justify the answer.	12	3	3	2
31. a.i.	What is relation matrix in crisp relation? Give an appropriate example for the same.	4	3	4	12
ii.	Differentiate between crisp sets and fuzzy sets. List down some of the major features of fuzzy sets with relevant examples.	8	3	4	12
	(OR)				
b.	Explain about the evaluation of the fuzzy rules and aggregation of output fuzzy sets with suitable examples.	12	3	4	12
32. a.i.	How would you apply the genetic algorithm for the given problem? Mention the steps to be followed for the same.	6	3	5	12
ii.	Write about the population of the TSP with your own sample data and diagram.	6	3	5	12
	(OR)				
b.i.	Write notes on GA cycle and fitness function.	4	2	5	12
ii.	Write notes on the following (1) Natural evolution (2) Mutation (3) Cross over (4) Selection	8	2	5	12

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Reg. No.														

B.Tech. DEGREE EXAMINATION, JUNE 2023
Fifth & Sixth Semester

18CSE352T – NEURO FUZZY AND GENETIC PROGRAMMING
(For the candidates admitted during the academic year 2018-2019 to 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

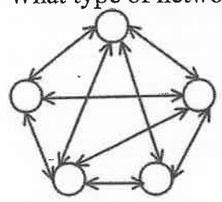
PART – A (20 × 1 = 20 Marks)
Answer **ALL** Questions

1. What kind of activation function is this? 1 1 1 1

$$y\_out = f(y\_in) = \begin{cases} 1, if\ y\_in > \theta \\ 0, if\ y\_in \le \theta \end{cases}$$

(A) Binary step function (B) Bipolar step function
(C) Binary threshold function (D) Bipolar threshold function

2. What type of network is this? 1 2 1 1



(A) Feed-forward networks (B) Fully-connected recurrent network
(C) Recurrent network with self loops (D) Multiplayer feed forward network

3. What function is this? $g(x) = \frac{1}{1+e^{-\sigma x}}$ 1 1 1 1

(A) Binary step function (B) Binary threshold function
(C) Binary sigmoid function (D) Bipolar sigmoid function

4. Which rule is used during the training in ADALINE? 1 2 1 1
(A) Hebb rule (B) Perceptron rule
(C) Delta rule (D) ADA rule

5. Which of the following is a metric for similarity? 1 2 2 2
(A) Weighted sums (B) Activation values
(C) Euclidean distance (D) Bias

6. Hopfield network is used for _____. 1 1 2 2
(A) Pattern classification (B) Pattern clustering
(C) Pattern association (D) Pattern prediction

7. Which network is used for unsupervised learning? 1 1 2 2
(A) Bidirectional associative memory (B) Hetero associative net
(C) Self-organizing map (D) Learning vector quantization

8. Which of the following neural net has a topological structure among the cluster units? 1 1 2 2
(A) MAXNET (B) Kohonen's self-organizing map
(C) Learning vector quantization (D) ART

9. Let $U = \{a,b,c,d\}$ and $P = \frac{0.7}{a} + \frac{1.0}{b} + \frac{0.8}{c} + \frac{1.0}{d}$ be a fuzzy set on U. then what is the cardinality of P? 1 3 3 2
(A) 1.5 (B) 3.5
(C) 1.0 (D) 4

10. Let F be a fuzzy set on the universe $U = \{a,b,c,d,e\}$. 1 3 3 2
$F = \frac{0.5}{a} + \frac{0.3}{b} + \frac{0.7}{c} + \frac{0.0}{d} + \frac{0.3}{e}$. Find the level set L(F).
(A) {0.3, 0.5, 0.7} (B) {0.3, 0.3, 0.5, 0.7}
(C) {0.5, 0.7} (D) {0.3, 0.7}

11. Which of the following is a possible conclusion if you apply simplification rule for the premise "I have a son and I have a daughter"? 1 3 3 2
(A) I have two children (B) I have a son and a daughter
(C) I have a daughter (D) My daughter is younger than my son

12. Let $U = \{a,b,c\}$ and $P = \frac{0.7}{a} + \frac{0.8}{c}$ be a fuzzy set on U. Then what is the support of P? 1 3 3 2
(A) {a, b, c} (B) {a, b}
(C) {b, c} (D) {a, c}

13. Which of the following is the first step in fuzzy inference system? 1 2 4 2
(A) Fuzzification of the input variables (B) Evaluation of the fuzzy rules
(C) Application of fuzzy operators on antecedent parts (D) Defuzzification of the resultant fuzzy set

14. Fuzzy rules are evaluated by employing some implication process. What is the input to the implication process? 1 2 4 2
(A) The number provided by applying fuzzy operators on the antecedent parts of the rules
(B) A fuzzy set representing linguistic values
(C) Reshaped fuzzy set corresponding to the consequent parts of the rule
(D) Fuzzy sets corresponding to the antecedent part

15. Which of the following is the consequent part of the rule "If the service is poor OR food is rancid, then tip is cheap"? 1 3 4 2
(A) Tip is cheap (B) Service is poor
(C) Food is rancid (D) Food is rancid OR service if poor

16. Which of the following is not a defuzzification method? 1 2 4 2
(A) Centroid (B) Centre-of-sums
(C) Median (D) Mean-of-maxima

17. Which of the following genetic operators results in exchange of genetic material between two chromosomes? 1 2 5 12
(A) Selection (B) Crossover
(C) Mutation (D) Chromosoming

18. Which of the following search strategy does not have the capacity to overcome the problem of local optima? 1 2 5 12
(A) Genetic algorithm (B) Simulated annealing
(C) Hill climbing (D) Variable neighbourhood search

19. In GA, the quality of the solution is indicated by _____. 1 2 5 12
(A) Selection function (B) Crossover function
(C) Mutation function (D) Fitness function

20. The average fitness of the mating pool is usually _____ than that of the current population. 1 2 5 1
(A) Lesser (B) Higher
(C) Equal (D) Not related

PART – B (5 × 4 = 20 Marks) Marks BL CO PO
Answer **ANY FIVE** Questions

21. Define and explain the Hebb's learning rule with an example. 4 1 1 1

22. Mention five [5] similarities between BNN and ANN. 4 2 1 1

23. Elucidate the use of bias in ANN with an appropriate diagram. 4 3 2 1

24. Explain about local minima problem. Discuss the possible ways to overcome the same. 4 3 2 2

25. Illustrate the fuzzy membership function with an example. 4 2 3 2

26. Describe the application of fuzzy operators on the antecedent parts of the rules with necessary examples. 4 3 4 2

27. Explain about the structure of a rule-based expert system with a neat sketch. 4 2 5 12

PART – C (5 × 12 = 60 Marks) Marks BL CO PO
Answer **ALL** Questions

28. a. Design and explain the logical And-Not function with an ADALINE network. 12 2 1 1

(OR)