

Register No:

Name:

SAINTGITS COLLEGE OF ENGINEERING (AUTONOMOUS)

(AFFILIATED TO APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY, THIRUVANANTHAPURAM)

SIXTH SEMESTER B.TECH DEGREE EXAMINATION(R,S), MAY 2024**Robotics and Automation****(2020 SCHEME)****Course Code : 20RBT372****Course Name : Soft Computing Techniques****Max. Marks : 100****Duration:3 Hours****PART A***(Answer all questions. Each question carries 3 marks)*

1. Explain how a biological neuron and an artificial neuron are related.
2. Distinguish between soft and hard computing.
3. Summarize auto-associative memory in ANN with apt illustrations.
4. 'BAM returns patterns of different sizes.' Justify the statement diagrammatically.
5. Describe multi-objective decision-making in fuzzy systems.
6. Compare and contrast classic logic and fuzzy logic with an example each.
7. Is there a need for fuzzy classification? Justify your answer with an example.
8. Paraphrase adaptive neuro-fuzzy inference systems.
9. Give an application of GA in image processing.
10. State the factors affecting convergence of GA. Illustrate the same.

PART B*(Answer one full question from each module, each question carries 14 marks)***MODULE I**

11. List and explain the various steps of the back propagation algorithm. 14

OR

12. Explain the three artificial neural network learning methodologies. 14

MODULE II

13. Design a Hebb network to realize a basic gate. 14

OR

14. Using apt illustrations, describe self-organizing maps. Draw and explain Kohonen networks. 14

MODULE III

15. $R = \begin{bmatrix} 0.4 & 0.1 & 0.7 \\ 0.1 & 0.2 & 0.2 \\ 0.4 & 0.5 & 0.3 \end{bmatrix}$ Consider the fuzzy relation R defined in A x A. Check whether the fuzzy relation is i) Reflexive, ii) Symmetric and iii) Transitive. 14

relation is i) Reflexive, ii) Symmetric and iii) Transitive.

OR

16. Consider the two fuzzy sets A and B such that $A = \left\{ \frac{0.2}{2} + \frac{0.5}{4} + \frac{0.3}{6} + \frac{0.8}{8} + \frac{0.1}{10} \right\}$ and $B = \left\{ \frac{1}{2} + \frac{0.2}{4} + \frac{0.4}{6} + \frac{0.5}{8} + \frac{0.2}{10} \right\}$. Find their union, intersection, complement, bounded sum and bounded difference. 14

MODULE IV

17. Illustrate and explain the Centroid de-fuzzification method with the help of an example. 14

OR

18. Define fuzzy logic control. Illustrate the block diagram of a closed loop fuzzy control system. Explain the importance of fuzzy rules in the design of a fuzzy logic controller. Enumerate the four structures of the fuzzy production rule system. 14

MODULE V

19. Enlist and explain the various features of evolutionary algorithms. 14

OR

20. Paraphrase the Roulette Wheel and Boltzmann selection procedures adopted in GA. 14
