| Reg.No.: | | | | | | | | | | | | |
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VIVEKANANDHA COLLEGE OF ENGINEERING FOR WOMEN
[AUTONOMOUS INSTITUTION AFFILIATED TO ANNA UNIVERSITY, CHENNAI]
Elayampalayam – 637 205, Tiruchengode, Namakkal Dt., Tamil Nadu.

**Question Paper Code: 50014**

B.E. / B.Tech. DEGREE END-SEMESTER EXAMINATIONS – NOV. / DEC. 2024
Seventh Semester
Computer Science and Engineering
U19CSV35 – SOFT COMPUTING
(Regulation 2019)

Time: Three Hours Maximum: 100 Marks

Answer ALL the questions

| Knowledge Levels | K1 – Remembering | K3 – Applying | K5 - Evaluating |
|---|---|---|---|
| (KL) | K2 – Understanding | K4 – Analyzing | K6 - Creating |

PART – A

(10 x 2 = 20 Marks)

| Q.No. | Questions | Marks | KL | CO |
|---|---|---|---|---|
| 1. | What does ANS stand for in neural networks? | 2 | K1 | CO1 |
| 2. | Illustrate the primary goal of Support Vector Machines. | 2 | K2 | C01 |
| 3. | Outline the key characteristic of a fuzzy set. | 2 | K2 | CO2 |
| 4. | Define defuzzification. | 2 | K1 | CO2 |
| 5. | Infer the term "Neuro-Fuzzy Control". | 2 | K2 | CO3 |
| 6. | What does ANFIS stand for in fuzzy systems? | 2 | K1 | CO3 |
| 7. | Infer crossover in GA. | 2 | K2 | CO4 |
| 8. | How does fitness scaling affect the selection process in a GA? | 2 | K1 | CO4 |
| 9. | Tell the fundamental component used for representation in First-Order Logic. | 2 | K1 | CO5 |
| 10. | State the main goal of artificial intelligence (AI) search techniques? | 2 | K2 | CO5 |

## PART – B

(5 x 13 = 65 Marks)

| Q.No. | | | Questions | Marks | KL | CO |
|---|---|---|---|---|---|---|
| 11. | a) | i. | Draw and explain the structure of Boltzmann machine. | 6 | K3 | CO1 |
| | | ii. | Discuss about the learning process in Boltzmann machine. | 7 | | |
| | | | (OR) | | | |
| | b) | | Using Adaline network to train ANDNOT function with bipolar inputs and targets, Perform 2 epochs of training. | 13 | K3 | CO1 |
| 12. | a) | i. | Differentiate between Mamdani FIS and Sugeno FIS. | 4 | K1 | CO2 |
| | | ii. | Describe the membership functions for the following linguistic phrases.<br>a. Very tall<br>b. fairly tall<br>c. not very short | 9 | | |
| | | | (OR) | | | |
| | b) | | Explain the different types of membership function used in fuzzification process. | 13 | K3 | CO2 |
| 13. | a) | i. | Discuss the concept of Coactive Neuro-Fuzzy Modelling. How does it enhance the performance of a fuzzy system compared to traditional fuzzy models? Provide an example of its application. | 6 | K3 | CO3 |
| | | ii. | Describe the process of building a Classification and Regression Tree (CART). How do CARTs handle both classification and regression tasks, and what are the advantages of using them? | 7 | | |
| | | | (OR) | | | |
| | b) | | Construct the Neuro-fuzzy system for 2 Input and One Output with 6 Rules and 3 Membership function and explain. | 13 | K3 | CO3 |
| 14. | a) | | Explain the major components of genetic algorithm with flow chart. | 13 | K1 | CO4 |
| | | | (OR) | | | |
| | b) | | Explain different cross over operations performed in GA. | 13 | K2 | CO4 |
| 15. | a) | | Explain the difference between depth-first search (DFS) and breadth-first search (BFS) techniques. Discuss their advantages and disadvantages in terms of time complexity, space complexity, and application scenarios. | 13 | K1 | CO5 |
| | | | (OR) | | | |

| | | | | | |
|---|---|---|---|---|---|
| b) | i. | What is forward reasoning in the context of logical inference? Describe the process with the help of an example. | 6 | K1 | CO5 |
| | ii. | How is searching used to provide solutions and also describe some real-world problems? Explain using suitable example. | 7 | | |

## PART – C

(1 x 15 = 15 Marks)

| Q.No. | | Questions | Marks | KL | CO |
|---|---|---|---|---|---|
| 16. | a) | Design a fuzzy logic controller to simulate a temperature control system for a room. | 15 | K3 | CO2 |
| | | (OR) | | | |
| | b) | A budget airline company operates 3 plains and employs 5 cabin crews. Only one crew can operate on any plain on a single day, and each crew cannot work for more than two days in a row. The company uses all planes every day. A Genetic Algorithm is used to work out the best combination of crews on any particular day. | | K3 | CO4 |
| | | i. Suggest what chromosome could represent an individual in this algorithm? | 3 | | |
| | | ii. Suggest what could be the alphabet of this algorithm? What is its size? | 3 | | |
| | | iii. Suggest a fitness function for this problem. | 3 | | |
| | | iv. How many solutions are in this problem? Is it necessary to use Genetic Algorithms for solving it? What if the company operated more plains and employed more crews? | 6 | | |