C   **470B2**   **Total pages: 2**

Register No: ………………………   Name: ....

SAINTGITS COLLEGE OF ENGINEERING (AUTONOMOUS)
(AFFILIATED TO APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY, THIRUVANANTHAPURAM)
SECOND SEMESTER MCA DEGREE EXAMINATION(R,S), MAY 2024
(2021 SCHEME)

Course Code   :   **21CA203-D**

Course Name   :   **Computational Intelligence**

Max. Marks   :   **60**   **Duration:3 Hours**

PART A
(Answer all questions. Each question carries 3 marks)

1. Write short notes on adaptation techniques. List out some factors that can make adaptation difficult in real-time applications.

2. Write a short note on biological basis for evolutionary computation.

3. How do the operations of selection, crossover and mutation impact the effectiveness and efficiency of evolutionary computation algorithms?

4. Define Evolutionary Computation(EC).

5. What are the advantages and disadvantages of neural networks compared to traditional machine learning algorithms?

6. What is the role of processing elements in neural networks? How do they contribute to the network's overall functioning?

7. Discuss the challenges and limitations of fuzzy logic.

8. Provide examples of real-world applications where fuzzy sets are used to model ambiguity or vagueness effectively.

9. Discuss the advantages of using EFRS over manual or heuristic-based methods in real-world application.

10. Write a note on the Artificial Neural Fuzzy Inference System(ANFIS).

PART B
(Answer one full question from each module, each question carries 6 marks)
MODULE I

11. Explain the concept of generalization in the context of computational intelligence. How does it differ from hard computing in artificial intelligence?   6

OR

12. How do Artificial Neural Networks (ANNs) mimic the biological basis of neural networks?   6

MODULE II

13. Explain the concept of swarm intelligence and its relevance to particle swarm optimization.   6
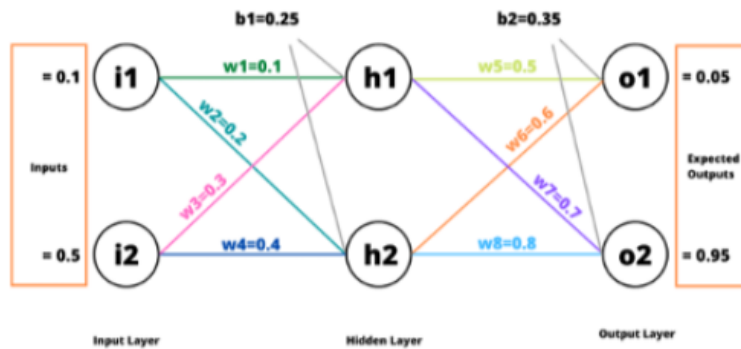
OR

14. How does evolutionary computation serve as a problem-solving paradigm in diverse domains?   6
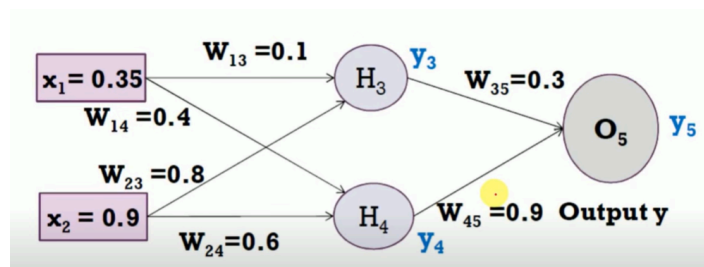
MODULE III

15. a) Explain the input layer, hidden layer and output layer computations in the backpropagation network.   6

   b) Find the total error at the output for a given neural network.

OR

16. Given neurons with sigmoid activation functions, perform both a forward and backward pass across the network. Assume a target output (y) of 1, with a learning rate set at 0.9. Perform another feed forward.   6

MODULE IV

17. Design a fuzzy room temperature controller using Mamdani Model.   6

OR

18. Consider two fuzzy sets A(x) and B(x)   6
   A(x) = {(x1,0.1),(x2,0.2),(x3,0.3),(x4,0.4)}
   B(x) = {(x1,0.1),(x2,0.5),(x3,0.3),(x4,0.6)}
   Perform the following:
   a) Intersections of two fuzzy sets
   b) Union of two fuzzy sets
   c) Multiplication of fuzzy sets by a crisp number 4
   d) Power of a fuzzy set
   e) Algebraic sum of two fuzzy sets
   f) Bounded sum of two fuzzy sets

MODULE V

19. Explain the ga() routine in the fuzzy evolutionary fuzzy rule system implementation.   6

OR

20. Describe about techniques involved in data mining system with an example.   6

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