

GURU TEGH BAHADUR INSTITUTE OF TECHNOLOGY

DEPARTMENT OF CSE-AIML

ASSIGNMENT – IV

SOFT COMPUTING (SC-401T)

Programme / Semester	B.Tech. CSE-AIML / VII Semester
Unit	Unit IV – Artificial Neural Networks

1. What is an Artificial Neural Network (ANN)? Explain its basic concept.
2. Describe the biological inspiration behind Artificial Neural Networks.
3. What is an artificial neuron? Explain its basic components.
4. Define input, weight, bias and activation function in an artificial neuron.
5. Explain the mathematical model of an artificial neuron with a suitable example.
6. What is an activation function? Why is it required in a neural network?
7. Explain any four commonly used activation functions.
8. Differentiate between linear and nonlinear activation functions.
9. What is meant by ANN architecture? Explain the basic layers of a neural network.
10. Differentiate between single-layer and multilayer neural networks.
11. What is a recurrent neural network? How does it differ from a feed-forward network?
12. Explain supervised, unsupervised and reinforcement learning in the context of neural networks.
13. Differentiate between supervised and unsupervised learning with suitable examples.
14. What is training of an Artificial Neural Network? Explain the general training process.
15. What is a learning rate? Explain its significance during ANN training.
16. Explain the concept of error correction and weight adjustment in neural-network learning.
17. What is a perceptron? Explain its architecture and working.
18. Explain the perceptron learning rule.
19. Describe the steps involved in training a perceptron for a classification problem.
20. Explain how an ANN can be used for pattern recognition.
21. Discuss the applications of Artificial Neural Networks in prediction and classification problems.
22. Explain any three real-life applications of Artificial Neural Networks.
23. What are Fuzzy Neural Systems? Explain the concept of integrating fuzzy logic with neural networks.
24. What are Genetic Fuzzy Systems? Explain how Genetic Algorithms can be used to tune a fuzzy system.

25. What are Genetic Neural Systems? Explain how evolutionary techniques can be used to optimize neural-network parameters.
26. Compare Artificial Neural Networks, Fuzzy Logic and Genetic Algorithms in terms of learning, uncertainty handling and optimization.
27. Explain the concept of hybrid soft-computing systems and discuss the need for combining different soft-computing techniques.
28. Consider a classification problem with several input features. Explain how an ANN could be designed, trained and evaluated for the problem.
29. Discuss the major advantages and limitations of Artificial Neural Networks.

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DEPARTMENT OF CSE-AIML

ASSIGNMENT – III

SOFT COMPUTING (SC-401T)

Programme / Semester	B.Tech. CSE-AIML / VII Semester
Unit	Unit III – Genetic Algorithms

1. What is a Genetic Algorithm (GA)? Explain its basic idea.
2. What is the biological inspiration behind Genetic Algorithms?
3. Why are Genetic Algorithms considered probabilistic search techniques?
4. Define chromosome, gene, allele and population in the context of Genetic Algorithms.
5. What is a fitness function? Why is it important in a Genetic Algorithm?
6. Explain the basic architecture or framework of a Genetic Algorithm.
7. What is chromosome encoding? Explain binary encoding with an example.
8. Describe real-valued and permutation encoding techniques.
9. What factors should be considered while selecting an appropriate encoding scheme?
10. Explain the process of population initialization in a Genetic Algorithm.
11. What is selection in a Genetic Algorithm? Why is it required?
12. Explain fitness-proportionate (roulette-wheel) selection.
13. Explain tournament selection and rank selection.
14. What is crossover? Explain its role in a Genetic Algorithm.
15. Explain single-point crossover with a suitable example.
16. Explain multi-point and uniform crossover techniques.
17. What is mutation? Why is mutation necessary in Genetic Algorithms?
18. Explain the bit-flip mutation operator with an example.
19. Describe the complete Genetic Algorithm cycle from initialization to termination.
20. What are the important parameters of a Genetic Algorithm? Explain the role of population size, crossover rate and mutation rate.
21. What are the common termination criteria used in Genetic Algorithms?
22. Explain the difference between exploration and exploitation in Genetic Algorithm search.
23. Describe how a Genetic Algorithm can be used to solve a single-objective optimization problem.

24. Consider a simple optimization problem and explain how chromosomes, fitness values, selection, crossover and mutation would be applied to obtain an improved solution.
25. Discuss the major advantages and limitations of Genetic Algorithms in solving optimization problems.
26. Explain any three real-life applications of Genetic Algorithms.
27. Compare Genetic Algorithms with conventional optimization techniques with respect to search strategy, derivative requirement, robustness and solution space.
28. Explain how changing crossover and mutation rates can affect the performance of a Genetic Algorithm.

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DEPARTMENT OF CSE-AIML

ASSIGNMENT – II

SOFT COMPUTING (SC-401T)

Programme / Semester	B.Tech. CSE-AIML / VII Semester
Unit	Unit II – Fuzzy Logic

1. What is fuzzy logic? How does it differ from classical Boolean logic?
2. Define a fuzzy set with a suitable example.
3. What is a membership function? Explain its significance in fuzzy logic.
4. What is a linguistic variable? Give a suitable example.
5. List and explain any four commonly used membership functions.
6. Differentiate between crisp sets and fuzzy sets.
7. Explain the basic operations on fuzzy sets: union, intersection and complement.
8. What are the important properties of fuzzy-set operations?
9. Define a fuzzy relation. How is it represented?
10. Explain the composition of fuzzy relations with a suitable example.
11. What are fuzzy propositions and fuzzy rules?
12. Explain the structure and components of a fuzzy rule-based system.
13. What is fuzzy inference? Explain the basic process of fuzzy reasoning.
14. Differentiate between fuzzification and defuzzification.
15. Why is defuzzification required in a fuzzy inference system?
16. Explain any three commonly used defuzzification techniques.
17. Describe the working of a fuzzy inference system with a neat block diagram.
18. Explain the complete process of a fuzzy controller from input measurement to final output.
19. Consider a temperature-control system. Identify suitable linguistic variables, membership functions and fuzzy rules that could be used to control the temperature.
20. Explain how fuzzy logic can be applied to decision-making under uncertain or imprecise conditions.
21. A student wants to design a fuzzy system to classify academic performance based on attendance and marks. Identify suitable inputs, linguistic variables and possible fuzzy rules.
22. Discuss any three real-life applications of fuzzy logic and explain how fuzzy reasoning is useful in each application.

23. Compare classical logic and fuzzy logic with respect to truth values, sets, reasoning and handling of uncertainty.
24. Explain the advantages and limitations of fuzzy logic in real-world applications.

GURU TEGH BAHADUR INSTITUTE OF TECHNOLOGY

DEPARTMENT OF CSE-AIML

ASSIGNMENT – I

SOFT COMPUTING (SC-401T)

Programme / Semester	B.Tech. CSE-AIML / VII Semester
Unit	Unit I – Introduction to Soft Computing

1. What is Soft Computing? State its basic objective.
2. What is meant by a computing system?
3. Differentiate between Soft Computing and Hard Computing.
4. List any four characteristics of Soft Computing.
5. Why is tolerance for imprecision important in Soft Computing?
6. What is meant by uncertainty in problem solving?
7. Name the major techniques used in Soft Computing.
8. What is meant by approximation in Soft Computing?
9. Explain the concept of Soft Computing and discuss why it is useful for solving complex real-world problems.
10. Compare Soft Computing and Hard Computing with respect to input data, uncertainty, precision, adaptability and problem-solving approach.
11. Explain the important characteristics of Soft Computing in detail with suitable examples.
12. Discuss the role of approximation and tolerance for imprecision in Soft Computing.
13. Explain how Soft Computing techniques can deal with uncertainty and incomplete information.
14. Describe the major areas of application of Soft Computing in engineering and real-life situations.
15. A conventional system requires precise input values, while a real-world decision may involve vague or uncertain information. Explain why Soft Computing may be appropriate in such a situation.
16. Consider a real-life application such as traffic control, medical diagnosis, weather prediction or pattern recognition. Identify the limitations of a purely Hard Computing approach and discuss how Soft Computing can address them.
17. Differentiate among Fuzzy Logic, Genetic Algorithms and Artificial Neural Networks at a conceptual level. Mention the type of problems for which each technique can be used.
18. Explain, with a suitable real-life example, how the characteristics of Soft Computing contribute to intelligent decision-making.