

May-25-0781

CSPC-414 (Artificial Intelligence in Engineering)
[CE, ME, EEE, TE] Common for all

B.Tech. 4th (NEP)

Time : 3 Hours

Max. Marks : 60

The candidates shall limit their answers precisely within the answer-book (40 pages) issued to them and no supplementary/continuation sheet will be issued.

Note : Attempt five questions in all by selecting one question each from section A, B, C and D. Section E is compulsory.

SECTION - A

1. (a) Explain the concept of Artificial Intelligence (AI). Describe any three general applications of AI in modern-day technology. Explain how AI is utilized in each of these applications. (6)
- (b) Describe the symbolic and sub-symbolic approaches to AI. How do they differ in representing knowledge and solving problems? (6)

OR

2. (a) Explain Heuristic Search Techniques. Discuss how they improve the efficiency of search algorithms? (6)
- (b) What are intelligent systems in AI? Provide an example of an intelligent system and discuss its functioning. (6)

SECTION - B

3. (a) What is reinforcement learning in Machine Learning? Describe its basic components and provide an example of where it can be applied. (6)

- (Signature)
- (b) Explain the concept of overfitting and underfitting in Machine Learning. How can they affect the model's performance, and how can they be avoided? (6)

OR

4. (a) Explain the importance of data preprocessing in Machine Learning. Discuss how techniques like data cleaning, normalization, and scaling affect the performance of models. (6)
- (b) What are the differences between classification and regression in supervised learning? Provide an example of each. (6)

SECTION - C

5. (a) How are Artificial Neural Networks (ANNs) applied in engineering fields? Discuss at least two engineering applications where ANNs are used. (6)
- (b) How does weight initialization affect the training of Artificial Neural Networks? Discuss the impact of improper initialization on convergence and learning. (6)

OR

6. (a) Discuss the role of the learning rate in training Artificial Neural Networks. What impact does the learning rate have on the efficiency and effectiveness of learning? (6)
- (b) What is the role of the activation function in a ANNs? Discuss different types of activation functions used in artificial neural networks with examples. (6)

SECTION - D

7. (a) Describe the working principle of a Genetic Algorithm. How are chromosomes selected, crossed over, and mutated in each generation to reach an optimal solution? (6)

[P.T.O.]

- (b) Explain the concept of Fuzzy Set Theory. How do fuzzy sets differ from classical sets, and what are the key properties of fuzzy sets? (6)

OR

8. (a) Draw and explain the flowchart of a Genetic Algorithm. Discuss each step briefly, from initialization to termination. (6)

- (b) Compare and contrast Fuzzy Logic and Genetic Algorithms. Discuss how each technique works and the types of problems they are suited to solve, particularly in the context of engineering applications. (6)

SECTION - E (Compulsory)

9. (a) What is the difference between BFS and DFS in terms of memory usage?

- (b) Why is feature selection important in Machine Learning models?

- (c) What are the advantages of using multi-layer networks?

- (d) What is the key difference between forward propagation and back propagation in training ANNs?

- (e) How does a Genetic Algorithm differ from traditional optimization methods?

- (f) What is the purpose of defuzzification in Fuzzy Logic?

(6×2=12)