BT-4/M-24   44227

INTELLIGENT SYSTEMS
PC-CS-AIML-204A

Time : Three Hours]   [Maximum Marks : 75

Note : Attempt *Five* questions in all, selecting at least *one* question from each Unit. All questions carry equal marks.

Unit I

1. (a) What distinguishes NP-complete problems from NP-hard problems in the context of artificial intelligence ?   **7**

    (b) Discuss the role of knowledge bases and data-driven approaches in AI problem-solving, and provide examples of how each is utilized in real-world AI applications.   **8**

2. (a) Differentiate between neat and scruffy AI approaches, providing examples of each and discussing their respective advantages and limitations.   **8**

(b) Compare and contrast symbolic AI and sub-symbolic AI techniques. 7

Unit II

3. (a) How does Best First Search differ from other heuristic search algorithms such as Hill Climbing and Beam Search ? 8

(b) Discuss the principles of Tabu Search and how it overcomes limitations of other local search algorithms by incorporating memory-based mechanisms. 7

4. (a) Describe the principles of Principal Component Analysis (PCA) and Independent Component Analysis (ICA) and how they are used for dimensionality reduction and feature extraction in high-dimensional data sets. 8

(b) Discuss the basic concepts of information theory and Bayesian learning and explain how they are applied in optimization algorithms. 7

Unit III

5. (a) Contrast forward-chaining and backward-chaining as data-driven and goal-driven strategies, respectively in the context of intelligent systems. 7

(b) How does knowledge acquisition contribute to the development of intelligent systems and what are the primary methods used to gather and represent knowledge effectively ? 8

6. (a) How do conflict resolution mechanisms operate in intelligent systems and what strategies are employed to handle conflicts that arise during the reasoning process ? 8

(b) Discuss the role of computational intelligence in the design and implementation of intelligent systems. 7

Unit IV

7. (a) Explain the importance of Unified Modeling Language (UML) in software engineering and how it aids in visualizing and documenting complex systems. 8

(b) How does possibility theory contribute to understanding uncertainty in decision-making processes, particularly within fuzzy sets and fuzzy logic frameworks ? 7

8. (a) Explore the key application areas of expert systems and decision support systems, highlighting their impact on various industries and domains. **8**

(b) In what ways do deep learning techniques, specifically in speech and vision applications, leverage data abstraction and advanced algorithms to achieve state-of-the-art performance ? **7**