TCS–706

B. TECH. (CSE)
(SEVENTH SEMESTER)
END SEMESTER
EXAMINATION, Dec., 2023
ARTIFICIAL INTELLIGENCE

Time : Three Hours
Maximum Marks : 100

Note : (i) All questions are compulsory.

(ii) Answer any *two* sub-questions among (a), (b) and (c) in each main question.

(iii) Total marks in each main question are **twenty**.

(iv) Each sub-question carries 10 marks.

1. (a) How do game theory concepts and algorithms play pivotal roles in problem-solving strategies within competitive games like chess or multiplayer video games ? Illustrate how these theoretical

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frameworks aid in determining optimal moves, predicting opponent behaviors, and formulating winning strategies, emphasizing their practical application and impact on decision-making processes in gaming environments. Explain any one algorithm used in game playing.   (CO1)

(b) Write short notes on the following : (CO1)

(i) Hill Climb Algorithm

(ii) A* Algorithm

Compare and contrast these strategies in terms of their efficiency, optimality and applicability to different problem domains, providing examples to illustrate their strengths and limitations.

(c) Explain the different types of AI agents, including simple reflex agents, model-based reflex agents, goal-based agents, utility-based agents, and learning agents. Illustrate each type with examples from various domains and discuss their characteristics, capabilities, and limitations in problem-solving.   (CO1)

2. (a) Explain the role of context-free grammar in parsing techniques. Discuss the concepts of terminals, non-terminals, production rules, and parse trees.   (CO2)

(b) Explain the foundational concepts of Conceptual Dependency Theory proposed by Roger Schank. Describe how this theory aims to represent knowledge and meaning in a manner understandable to computers, emphasizing its departure from traditional syntax-based approaches.(CO2)

(c) Discuss the following :   (CO2)

(i) Augmented Transition network

(ii) Transformational Grammer

(iii) Grammar Free Analyzers

3. (a) Compare and contrast the syntax and semantics of first-order logic. Explain how the syntax defines the structure of sentences in terms of logical symbols, while semantics provide interpretations and truth values to these sentences based on the assignment of meanings to symbols.   (CO3)

(b) Explain how Forward Deduction and Backward Deduction differ in their approaches to proving logical implications and discuss their respective strengths, weaknesses, and applications in problem-solving scenarios. Provide illustrative examples to demonstrate the step-by-step processes of each deduction method and highlight scenarios where one method might be more suitable or efficient than the other.   (CO3)

(c) Define Horn clauses in logic and highlight their distinctive characteristics. Explain how the structure of Horn clauses contributes to their computational properties.   (CO3)

4. (a) Describe the key components and architecture of expert systems. Explain how various components collaborate to emulate human expertise and facilitate problem-solving within a specific domain.   (CO4)

(b) Give the comparative analysis of DENDRAL, MYCIN, and DART. (CO4)

(c) Discuss knowledge acquisition techniques, the role of domain experts, knowledge engineering methodologies, and the challenges associated with ensuring the accuracy and relevance of the knowledge base over time.   (CO4)

5. (a) Explain the multifaceted process of pattern recognition, delineating its stages, techniques, and applications across diverse domains.   (CO5)

(b) Explain any five commands of LISP and PROLOG with syntax and examples.   (CO5)

(c) Write short notes on the following : (CO5)

   (i) Speech Recognition

   (ii) Object Identification