Exam.Code:0923
Sub. Code: 33552

2124
B.E. (Information Technology)
Fifth Semester
PCIT-502: Artificial Intelligence

Time allowed: 3 Hours **Max. Marks: 50**

NOTE: ***Attempt five questions in all, including Question No. I (Section-A) which is compulsory and selecting two questions each from Section-B-C. Any missing or misprinted data may be assumed suitably. All questions carry equal marks.***

x-x-x

Section-A

I. [2 x 5]

a. Describe the frame problem in Artificial Intelligence. Why is it challenging for AI?

b. Explain the concept of a utility-based agent. How does it differ from a simple reflex agent?

c. Describe a potential drawback of using the hill-climbing search technique.

d. Differentiate between admissibility and consistency in heuristic search. Why are these properties important?

e. In Bayesian networks, what is a conditional independence assumption, and why is it useful?

Section B

II. a) Explain how the Turing Test can be used to determine intelligence in machines. Discuss its limitations and any alternate approaches to measuring machine intelligence.

b) In computer vision, explain the concept of edge detection and its importance in image processing. Describe one edge detection technique.

III. a) Discuss the differences between breadth-first search (BFS), depth-first search (DFS), and iterative deepening search in terms of memory usage, completeness, and optimality.

b) Describe the minimax algorithm with a suitable example. How does alpha-beta pruning improve the efficiency of the minimax algorithm?

IV. a) Explain how semantic networks represent knowledge. Compare semantic networks to frames in terms of structure and usability.

b) Describe the process of forward and backward chaining in First-Order Logic (FOL). When would backward chaining be preferable over forward chaining, and why?

Section C

V. a) Explain the concept of non-monotonic reasoning. Give an example to illustrate a scenario where non-monotonic reasoning is necessary.

b) Discuss the differences between Dempster-Shafer theory and traditional probability theory. In what kind of applications is Dempster-Shafer theory more suitable?

VI. a) Discuss the structure and components of a hierarchical planning system. Provide an example of a problem that would benefit from hierarchical planning.

b) Explain how planning graphs can be used to improve the efficiency of planning algorithms. Describe a scenario where planning graphs might not be effective.

VII Describe the architecture of an expert system in detail, outlining each component's role and how they interact to solve complex problems. Select a specific domain (e.g., medical diagnosis or financial forecasting) and design an outline for an expert system that could operate within that domain. Explain how knowledge acquisition, inference mechanisms, and user interface are tailored to meet the needs of users in this domain. Additionally, discuss the challenges involved in developing and maintaining the knowledge base of such a system, including strategies to handle uncertainty and updates to the knowledge base over time.

x-x-x