Total No. of Questions: 6

Seat No.:

BACHELOR OF TECHNOLOGY (CBCS - 2023)
B. Tech. Sem-V Computer Science & Engineering : WINTER: 2025
SUBJECT: ARTIFICIAL INTELLIGENCE

Day : Thursday
Date : 18/12/2025

W-30725-2025

Time : 02:30 PM-05:30 PM
Max. Marks : 60

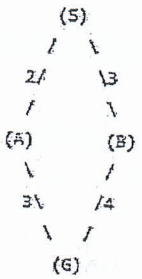
NB :
1. All questions are COMPULSORY.
2. Figures to the right indicate FULL marks.
3. Draw neat labeled WHEREVER necessary.

Q. 1 Explain any three real-world problems where Artificial Intelligence has been successfully applied. Describe the AI techniques used in each case and how they improved performance compared to traditional approaches. (10)

OR

Q. 1 Describe how a utility-based agent can make better decisions than a goal-based agent in autonomous drone navigation. Illustrate with an example how utility functions help in handling uncertainty or multiple goals (10)

Q. 2 Define Memory bound search? Explain the working of IDA*. Also, Find the shortest path from S (Start) to G (Goal) using IDA* on the following graph. (10)



Node	h(n)
S	3
A	2
B	4
G	0

OR

Q. 2 Prepare a comparison table for BFS, DFS, DLS, and Bidirectional Search in terms of completeness, optimality, time, and space complexity. (10)

Q. 3 Represent the following sentences in first-order logic, using a consistent vocabulary (which you must define): (10)

a. Not all students take both History and Biology.
b. Only one student failed History.
c. Only one student failed both History and Biology.
d. The best score in History was better than the best score in Biology.
e. Every person who dislikes all vegetarians is smart.
f. No person likes a smart vegetarian.
g. There is a woman who likes all men who are not vegetarians.
h. There is a barber who shaves all men in town who do not shave themselves.
i. No person likes a professor unless the professor is smart.
j. Politicians can fool some of the people all of the time, and they can fool all of the people

some of the time, but they can't fool all of the people all of the time.

OR

Q. 3 Consider the following sentences: (10)

1. John likes all kind of food
2. Apples are food
3. Chickens is food
4. Anything anyone eats and is not killed by is a food
5. Bill eats peanuts and is still alive
6. Sue eats everything Bill eats

- Conversion of sentences into formulas in predicate logic.

Prove that John like Peanut using backward chaining

Q. 4 Define a Markov Decision Process (MDP). Explain the components of an MDP and describe how the Bellman Equation is used to compute the optimal policy. (10)

OR

Q. 4 present the Blocks World problem using STRIPS notation. Define the operators PickUp(X), PutDown(X), Stack(X, Y), and UnStack(X, Y) along with their preconditions and effects. Explain how these operators can be used to move from an initial state to a goal state. (10)

Q. 5 Explain structure of Rule- Based expert system. (10)

OR

Q. 5 Define a fuzzy expert system? Explain how fuzzification and defuzzification processes work with an example. (10)

Q. 6 Explain the architecture and functioning of a Decision Support System (DSS). How does AI enhance decision-making in modern DSS? (10)

OR

Q. 6 Analyze key ethical dilemmas posed by AI decision-making systems, such as bias, accountability, and transparency. Suggest possible mitigation strategies. (10)

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