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Subject Code:- ACSBS0601

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NOIDA INSTITUTE OF ENGINEERING AND TECHNOLOGY, GREATER NOIDA

(An Autonomous Institute Affiliated to AKTU, Lucknow)

B.Tech

SEM: VI - THEORY EXAMINATION (20 - 20.....)

Subject: Artificial Intelligence

Time: 3 Hours

Max. Marks: 100

General Instructions:

IMP: Verify that you have received the question paper with the correct course, code, branch etc.

1. This Question paper comprises of **three Sections -A, B, & C**. It consists of Multiple Choice Questions (MCQ's) & Subjective type questions.
2. Maximum marks for each question are indicated on right -hand side of each question.
3. Illustrate your answers with neat sketches wherever necessary.
4. Assume suitable data if necessary.
5. Preferably, write the answers in sequential order.
6. No sheet should be left blank. Any written material after a blank sheet will not be evaluated/checked.

SECTION-A

20

1. Attempt all parts:-

1-a. Problems with AI are (CO1, K1)

1

- (a) Computing Power
- (b) Trust Deficit
- (c) Limited Knowledge
- (d) All of the mentioned

1-b. Tic Tac Toe Problem- Game Playing Strategy are (CO1, K1)

1

- (a) Maximize winning possibility assuming that opponent will try to minimize (Minimax Algorithm)
- (b) Ignore the unwanted portion of the search tree (Alpha Beta Pruning)
- (c) Evaluation(Utility) Function
- (d) All of the mentioned

1-c. A* algorithm is based on _____. (CO2, K1)

1

- (a) Depth-first search
- (b) Breadth-first search
- (c) Hill climbing search
- (d) Best-First-Search

1-d. The term _____ is used for a depth-first search that chooses values for one variable at a time and returns when a variable has no legal values left to assign. (CO2, K1)

1

- (a) Forward search
 - (b) Backtrack search
 - (c) Hill algorithm
 - (d) Reverse-Down-Hill search
- 1-e. Main disadvantages associated with hill-climbing search include: (CO3, K1) 1
- (a) Terminates at local optimum & Does not find optimum solution
 - (b) Terminates at global optimum & Does not find optimum solution
 - (c) Does not find optimum solution & Fail to find a solution
 - (d) Fail to find a solution
- 1-f. Alternative term used for informed search strategy is (CO3, K1) 1
- (a) Simple search
 - (b) Heuristic search
 - (c) Online search
 - (d) None of the mentioned
- 1-g. Identify the term that represents the judgmental or commonsense aspect of problem solving: (CO4, K2) 1
- (a) Heuristic
 - (b) Critical
 - (c) Value based
 - (d) Analytical
- 1-h. Choose the property that is not of representation of knowledge. (CO4, K6) 1
- (a) Representational Verification
 - (b) Representational Adequacy
 - (c) Inferential Adequacy
 - (d) Inferential Efficiency
- 1-i. Use the knowledge acquisition method that relies on retrieving and adapting solutions from previously solved cases. (CO5, K3) 1
- (a) Knowledge Elicitation
 - (b) Case-Based Reasoning
 - (c) Reinforcement Learning
 - (d) Protocol Analysis
- 1-j. Evaluate which reasoning strategy in expert systems proceeds from given facts to derive a conclusion using predefined rules. (CO5, K4) 1
- (a) Forward Chaining
 - (b) Backward Chaining
 - (c) Rule-Based Reasoning
 - (d) Heuristic Reasoning

2. Attempt all parts:-

- | | | |
|------|--|---|
| 2.a. | List two problems related to AI. (CO1, K1) | 2 |
| 2.b. | Differentiate between informed search and Uninformed Search. (CO2, K4) | 2 |
| 2.c. | Define MAX and MIN in min max algorithm. Give name of one application in which it used. (CO3, K1) | 2 |
| 2.d. | Explain De Morgan's Law with an example. (CO4, K2) | 2 |
| 2.e. | Define reinforcement learning as a training method where agents learn via rewards/punishments, optimizing actions in dynamic environments. (CO5, K1) | 2 |

SECTION-B

30

3. Answer any five of the following:-

- | | | |
|------|---|---|
| 3-a. | Describe the architecture of a learning agent. Explain how its components interact to improve performance through experience. (CO1, K2) | 6 |
| 3-b. | Explain some real-world applications of AI. (CO1, K2) | 6 |
| 3-c. | Explain the DFS algorithm with example. (CO2, K2) | 6 |
| 3-d. | Prepare a short note on- (CO2, K5)
a. Simple hill Climbing
b. Steepest-Ascent hill Climbing
c. Stochastic hill Climbing | 6 |
| 3.e. | Explain Travelling Salesperson Problem with an example. (CO3, K2) | 6 |
| 3.f. | Differentiate between Semantic Nets and Partitioned Nets. (CO4, K4) | 6 |
| 3.g. | Illustrate the architecture of a knowledge-based system, explaining the roles of its core components such as the knowledge base and inference engine. (CO5, K2) | 6 |

SECTION-C

50

4. Answer any one of the following:-

- | | | |
|------|--|----|
| 4-a. | Explain the scope of Artificial Intelligence across industries such as gaming, healthcare, and education. Analyze how AI contributes to shaping the future across these domains. (CO1, K4) | 10 |
| 4-b. | Compare and contrast the following pairs of concepts with respect to their functionalities and goals: (CO1, K4)
a. Strong AI vs. Weak AI
b. Goal-based Agent vs. Utility-based Agent | 10 |

5. Answer any one of the following:-

- | | | |
|------|---|----|
| 5-a. | Describe Hill Climbing Algorithm with its types, and also explain local maximum, global maximum, flat local maximum, current state, shoulder. (CO2, K2) | 10 |
| 5-b. | Prepare a short note on- (CO2, K5)
a. Uniform Cost Search
b. Iterative Deepening Depth First Search | 10 |

6. Answer any one of the following:-

- | | | |
|------|---|----|
| 6-a. | Design a state-space graph for the water jug problem (8L, 5L, 3L) and apply breadth-first search to divide water into two 4L portions. Document each state transition and validate the solution's optimality. (CO3, K5) | 10 |
|------|---|----|

- 6-b. Explain various ways of Knowledge Representation with an example of each. (CO3, K2) 10
7. Answer any one of the following:-
- 7-a. Explain Forward Chaining and Backward Chaining with diagram. (CO4, K2) 10
- 7-b. Explain Expert System is used. Draw and explain architecture of Expert System. (CO4, K2) 10
8. Answer any one of the following:-
- 8-a. Explain goal stack planning and compare it with alternative planning strategies. (CO5, K2) 10
- 8-b. Discuss Dempster-Shafer theory and compare it with Bayesian networks. (CO5, K2) 10

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