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NOIDA INSTITUTE OF ENGINEERING AND TECHNOLOGY, GREATER NOIDA
(An Autonomous Institute Affiliated to AKTU, Lucknow)

MCA Integrated

SEM: V - THEORY EXAMINATION (2025 - 2026)

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. Which of the following focus on creating machines with human-like intelligence. (CO1, K1) 1
- (a) Networking
- (b) Compiler
- (c) ML
- (d) AI
- 1-b. In which year AI was originated during the Dartmouth conference. (CO1, K1) 1
- (a) 1985
- (b) 1999
- (c) 1970
- (d) 1956
- 1-c. Which of the following is true about Uninformed search strategy . (CO2, K1) 1
- (a) Uses heuristic function
- (b) Does not use problem-specific knowledge
- (c) Explores optimistically
- (d) Uses evaluation function
- 1-d. Which search algorithm explores all neighbors of a node before deeper levels. (CO2, K2) 1
- (a) DFS
- (b) BFS
- (c) Iterative Deepening
- (d) A*

- 1-e. In semantic tableaux, an open branch indicates? (CO3, K1) 1
- (a) Table closes
 - (b) Tableau error
 - (c) Open branches remain
 - (d) None
- 1-f. Which of the following is first-order logic? (CO3, K1) 1
- (a) $P \text{ AND } Q$
 - (b) $\forall x P(x) \rightarrow Q(x)$
 - (c) $P(x) \text{ OR } Q(x)$
 - (d) $\text{NOT } P(x)$
- 1-g. Which of the following is a component of an Expert System? (CO4,K1) 1
- (a) Knowledge Base
 - (b) Inference Engine
 - (c) User Interface
 - (d) Agent
- 1-h. Forward chaining in rule-based systems is also called? (CO4,K2) 1
- (a) Data-driven reasoning
 - (b) Goal-driven reasoning
 - (c) Hybrid reasoning
 - (d) Case-based reasoning
- 1-i. Which of the following represents a form of AI planning? (CO5,K1) 1
- (a) State Space Search
 - (b) Linear Regression
 - (c) Decision Tree
 - (d) Backpropagation
- 1-j. In state space search, the solution is represented as (CO5,K1) 1
- (a) A sequence of actions
 - (b) A single agent
 - (c) A reward function
 - (d) A neural network

2. Attempt all parts:-

- 2.a. Explain the idea of AI in simple terms and describe how machines try to act intelligently. (CO1, K2) 2
- 2.b. Briefly differentiate between informed and uniformed search strategies. (CO2, K2) 2
- 2.c. Define semantic tableau. (CO3, K2) 2
- 2.d. Explain Expert System with an example. (CO4,K1) 2
- 2.e. Describe conditional planning in AI. (CO5,K2) 2

SECTION-B

30

3. Attempt all parts:-

- 3.a. Answer any one of the following:-

| | | |
|-------------------------|--|-----------|
| 3.a.(i) | Describe the difference between reactive and proactive agents. (CO1, K2) | 6 |
| 3.a.(ii) | Explain in detail the relationship between AI, machine learning, and deep learning. (CO1, K2) | 6 |
| 3.b. | Answer any one of the following:- | |
| 3.b.(i) | Analyze min-max algorithm with suitable example.(CO2, K4) | 6 |
| 3.b.(ii) | Describe the efficiency of A* search in optimal path finding with suitable example. (CO2, K3) | 6 |
| 3.c. | Answer any one of the following:- | |
| 3.c.(i) | Write Prolog rules for “X is cousin of Y”. (CO3, K3) | 6 |
| 3.c.(ii) | Apply Water Jug Problem to solve the problem for 8L and 3L jugs to measure 5L. (CO3, K3) | 6 |
| 3.d. | Answer any one of the following:- | |
| 3.d.(i) | Explain the architecture of a rule-based Expert System in detail. (CO4,K2) | 6 |
| 3.d.(ii) | Compare Forward and Backward Chaining in terms of efficiency and applicability. (CO4,K3) | 6 |
| 3.e. | Answer any one of the following:- | |
| 3.e.(i) | Describe multi-agent planning in detail with an example. (CO5,K3) | 6 |
| 3.e.(ii) | Explain Dempster-Shafer theory with a simple example. (CO5,K2) | 6 |
| <u>SECTION-C</u> | | 50 |
| 4. | Answer any <u>one</u> of the following:- | |
| 4-a. | Provide a detailed explanation of well-defined learning problems along with real examples. (CO1, K3) | 10 |
| 4-b. | Explore real-world applications of AI across sectors such as health, governance, and automation. (CO1, K3) | 10 |
| 5. | Answer any <u>one</u> of the following:- | |
| 5-a. | Define Best-First Search. How is it different from Greedy Search and A* Search? Explain its working with suitable example(CO2,K2) | 10 |
| 5-b. | Explain why Hill climbing selects neighbor with highest evaluation function. (CO2, K3) | 10 |
| 6. | Answer any <u>one</u> of the following:- | |
| 6-a. | Solve n-Queen problem for 8x8 board and show all solutions using backtracking. (CO3, K4) | 10 |
| 6-b. | Explain the Missionaries and Cannibals problem. Discuss state space, operators, constraints, and how production rules prevent unsafe states. (CO3, K3) | 10 |
| 7. | Answer any <u>one</u> of the following:- | |
| 7-a. | Design a rule-based system for diagnosing a simple medical condition. (CO4,K4) | 10 |
| 7-b. | Construct a Bayesian Network for a simple weather prediction problem and explain. (CO4,K4) | 10 |
| 8. | Answer any <u>one</u> of the following:- | |
| 8-a. | Design a swarm intelligence algorithm for path optimization and explain its steps. (CO5,K4) | 10 |

8-b. Compare inductive learning, reinforcement learning, and neural network learning. Provide suitable examples for each type. (CO5,K4)

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