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

B.Tech

SEM: IV - 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:-

- (1.1) DARPA is the abbreviation of (CO1,K1) 1
- (a) Defense Automatic Research Program Agency
 - (b) Defense Advanced Research Project Agency
 - (c) Defense Automatic Real Program Action
 - (d) Defense Advanced Real Program Action
- (1.2) Which statements among the following statements is/are true for AlphaGo?(CO1,K2) 1
- (a) It was developed by researchers at DeepMind
 - (b) It defeated the world champion in the game of chess
 - (c) It is an example of a weak AI agent
 - (d) None of the above
- (1.3) Which of the following search methods cannot be guaranteed to find a goal reaching plan to the 8-puzzle problem?(CO2,K2) 1
- (a) Bidirectional Search
 - (b) Depth First Search
 - (c) Breadth First Search
 - (d) Beam Search
- (1.4) _____ is the example of Uninformed search algorithm. (CO2,K2) 1
- (a) Greedy Best first Search
 - (b) A* Search
 - (c) Depth first search
 - (d) None of the above

- (1.5) Prolog is used in (CO3,K2) 1
- (a) Intelligent Database Retrieval
 - (b) Natural Language Understanding
 - (c) Machine Learning
 - (d) All of the above
- (1.6) Knowledge representation languages should be (CO3,K2) 1
- (a) Declarative
 - (b) Compositional
 - (c) Expressive
 - (d) All of the above
- (1.7) Hidden Markov Model is a (CO4,K2) 1
- (a) Fully observable model
 - (b) Partially observable model
 - (c) Depend on condition
 - (d) None of the mentioned
- (1.8) Probability theory is a part of (CO4,K2) 1
- (a) Decision Theory
 - (b) Utility Theory
 - (c) both of the above
 - (d) None of the mentioned
- (1.9) Convolutional neural networks are commonly used for (CO5,K1) 1
- (a) image recognition tasks
 - (b) natural language processing tasks
 - (c) speech recognition tasks
 - (d) none of the above
- (1.10) In neural network learning, regularization is used to: (CO5,K2) 1
- (a) increase the complexity of the model
 - (b) reduce the complexity of the model
 - (c) speed up the learning process
 - (d) none of the above

2. Attempt all parts:-

- (2.1) Define Model based agent. (CO1, K1) 2
- (2.2) Differentiate between the ways of search in DFS and BFS. (CO2, K2) 2
- (2.3) Define Syntax in Logical Representation. (CO3, K1) 2
- (2.4) Define resolution and write the steps for resolution. (CO4, K1) 2
- (2.5) How does reinforcement learning differ from supervised learning? (CO5, K2) 2

SECTION-B 30

Answer any one of the following:-

- (3.1) Describe AI, Deep learning and Machine learning and its relation with block diagram. (CO1, K2) 6

(3.2)	Describe the significance of AI in ECE. (CO1, K2)	6
Answer any one of the following:-		
(3.3)	Differentiate between informed and uninformed search. (CO2, K2)	6
(3.4)	Apply the Hill Climbing algorithm to a suitable AI scenario and evaluate its performance, strengths, and limitations. (CO2, K3)	6
Answer any one of the following:-		
(3.5)	Explain Disjunctive normal form (DNF) of Propositional logic. (CO3, K2)	6
(3.6)	Define Tautology and Contradiction with a real world example. (CO3, K2)	6
Answer any one of the following:-		
(3.7)	Draw the architecture of an expert system and define each block in brief. (CO4, K1)	6
(3.8)	Apply Utility Theory to a decision-making scenario and analyze the impact of different constraints on the outcome. (CO4, K3)	6
Answer any one of the following:-		
(3.9)	Explain the applications of unsupervised learning in AI. (CO5, K2)	6
(3.10)	How Dempster Shaper theorem works? Explain. (CO5, K2)	6
SECTION-C		50
4. Answer any <u>one</u> of the following:-		
(4.1)	Write down the difference between a world state, a state description, and a search node. Why is this distinction useful? (CO1, K1)	10
(4.2)	Why is learning important for intelligent agents? Can intelligent agents learn from past experiences? Why are intelligent agents called intelligent? (CO1, K2)	10
5. Answer any <u>one</u> of the following:-		
(5.1)	Explain iterative deepening heuristic search with an example. (CO2, K3)	10
(5.2)	Distinguish between Greedy Best-first Search and A* Search algorithm. (CO2, K4)	10
6. Answer any <u>one</u> of the following:-		
(6.1)	Discuss how can knowledge be represented using predicate logic. (CO3, K2)	10
(6.2)	Solve and analyze the Travelling Salesman problems using appropriate AI problem-solving frameworks. (CO3, K3)	10
7. Answer any <u>one</u> of the following:-		
(7.1)	"As per the law, it is a crime for an American to sell weapons to hostile nations. Country A, an enemy of America, has some missiles, and all the missiles were sold to it by Robert, who is an American citizen." Prove that "Robert is criminal" using forward chaining. (CO4, K2)	10
(7.2)	A man is known to speak the truth 2 out of 3 times. He throws a die and reports that the number obtained is a four. Find the probability that the number obtained is actually a four. (CO4, K2)	10
8. Answer any <u>one</u> of the following:-		
(8.1)	Explain Particle swarm optimization algorithm. (CO5, K2)	10
(8.2)	Describe the case studies of the AI in Smart Cities and Healthcare. (CO5, K4)	10