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

**BCA**

**SEM: III - 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. State space representation involves:(CO1,K1)

1

- (a) Initial state, actions, goal test, path cost
- (b) Task, performance, experience
- (c) Agent, environment, actions
- (d) None of the above

1-b. Problem reduction in AI helps because:(CO1,K2)

1

- (a) It breaks large problems into smaller manageable sub-problems
- (b) It increases complexity
- (c) It avoids learning
- (d) It removes constraints completely

1-c. Heuristic search is also known as:(CO2,K1)

1

- (a) Blind search
- (b) Informed search
- (c) Local search
- (d) Adversarial search

1-d. The main drawback of hill climbing is:(CO2,K2)

1

- (a) Excessive memory
- (b) Getting stuck in local maxima
- (c) Expanding too many nodes
- (d) Being optimal

1-e. In Resolution, a pair of complementary literals is:(CO3,K2)

1

(a) Cancelled	
(b) Added	
(c) Replaced	
(d) Ignored	
1-f. CNF is a conjunction of:(CO3,K1)	1
(a) Literals	
(b) Clauses	
(c) Quantifiers	
(d) None	
1-g. Utility function maps states to:(CO4,K2)	1
(a) Actions	
(b) Numbers	
(c) Variables	
(d) Facts	
1-h. Frame-based systems use:(CO4,K2)	1
(a) Inheritance	
(b) Resolution	
(c) Probabilistic reasoning	
(d) Scripts	
1-i. Dempster-Shafer theory deals with:(CO5,K2)	1
(a) Belief Functions	
(b) Frames	
(c) Trees	
(d) Nets	
1-j. Ant Colony Optimization is used for:(CO5,K2)	1
(a) Path optimization	
(b) Frames	
(c) Scripts	
(d) Semantic nets	
2. Attempt all parts:-	
2.a. Show how AI can be applied in the education field.(CO1,K3)	2
2.b. Apply the hill climbing algorithm on the function $f(x) = -(x-3)^2 + 9$ starting at $x=0$ . Show first two steps.(CO2,K3)	2
2.c. Construct a truth table for $P \wedge (Q \rightarrow R)$ .(CO3,K3)	2
2.d. Construct a simple rule-based system for traffic light control.(CO4,K3)	2
2.e. Explain the role of actuator in agent?(CO5,K2)	2
<b>SECTION-B</b>	<b>30</b>
3. Attempt all parts:-	
3.a. Answer any <u>one</u> of the following:-	
3.a.(i) Analyze four daily-life examples where AI is applied and explain their	6

impact.(CO1,K4)	
3.a.(ii) Evaluate the role of constraint satisfaction and problem-solving methods in making AI systems more efficient.(CO1,K5)	6
3.b. Answer any one of the following:-	
3.b.(i) Analyze the drawbacks of Hill Climbing and explain how Simulated Annealing overcomes them.(CO2,K4)	6
3.b.(ii) Show the step-by-step working of Iterative Deepening Depth-First Search on a tree with depth 3.(CO2,K3)	6
3.c. Answer any one of the following:-	
3.c.(i) Construct semantic tableau for $(P \vee Q) \rightarrow (R \wedge \neg Q)$ .(CO3,K3)	6
3.c.(ii) Evaluate the suitability of backtracking for solving the N-Queen problem and justify why it is an effective or ineffective strategy.(CO3,K5)	6
3.d. Answer any one of the following:-	
3.d.(i) Apply backward chaining to solve a simple job selection problem.(CO4,K3)	6
3.d.(ii) Analyze the architecture of expert systems with diagram.(CO4,K4)	6
3.e. Answer any one of the following:-	
3.e.(i) Describe different forms of learning in Artificial Intelligence.(CO5,K3)	6
3.e.(ii) Differentiate between genetic algorithm and neural networks(CO5,K4)	6
<b>SECTION-C</b>	<b>50</b>
4. Answer any <u>one</u> of the following:-	
4-a. Apply AI applications to explain how fraud detection is done in banking systems.(CO1,K3)	10
4-b. Analyze the problem of robot navigation using the principles of problem reduction. Break the navigation task into smaller subproblems, e and describe how each can be solved to enable the robot to reach its destination efficiently.(CO1,K4)	10
5. Answer any <u>one</u> of the following:-	
5-a. Analyze the differences between Uninformed and Informed search algorithms, and illustrate one informed search with an example.(CO2,K4)	10
5-b. Evaluate Adversarial Search by explaining its algorithm, advantages, and disadvantages with an example.(CO2,K5)	10
6. Answer any <u>one</u> of the following:-	
6-a. Design a semantic net for representing a family tree.(CO3,K6)	10
6-b. Evaluate role of scripts in representing events.(CO3,K5)	10
7. Answer any <u>one</u> of the following:-	
7-a. Analyze the architecture of knowledge-based systems with its main components.(CO4,K4)	10
7-b. Evaluate advantages of Bayesian networks in uncertain reasoning by using suitable example.(CO4,K5)	10
8. Answer any <u>one</u> of the following:-	
8-a. Analyze role of intelligent agents in smart homes.(CO5,K4)	10
8-b. Develop AI-based case study for healthcare patient monitoring.(CO5,K6)	10