.

Printed Page:-3 **Subject Code:- BMICSAI0303**

Roll. No:

NOIDA INSTITUTE OF ENGINEERING AND TECHNOLOGY, GREATER NOIDA
(An Autonomous Institute Affiliated to AKTU, Lucknow)
M.Tech Integrated
SEM: III - THEORY EXAMINATION (2025- 2026)
Subject: Artificial Intelligence

Time: 2 Hours **Max. Marks: 50**

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 15

1. Attempt all parts:-

1-a. An AI player evaluates three moves: h(A)=2, h(B)=4, h(C)=1. Which will it explore first under greedy search?(CO1,K2) 1

(a) A
(b) B
(c) C
(d) Depends

1-b. In the N-Queens problem, solution validity requires satisfying which set of constraints? (CO2,K2) 1

(a) No two queens in same row
(b) No two queens in same column
(c) No two queens in same diagonal
(d) All of the above

1-c. A tautology in propositional logic refers to(CO3,K1) 1

(a) Always false statement
(b) Always true statement
(c) Conditional contradiction
(d) Biconditional negation

1-d. If two events A and B are independent, which of the following is true?(CO4, K2) 1

(a) $P(A \cap B) = P(A) + P(B)$
(b) $P(A \cap B) = P(A) \times P(B)$
(c) $P(A \cup B) = P(A) \times P(B)$

(d) $P(A \cap B) = P(A) - P(B)$

1-e. Representation of uncertainty in Dempster-Shafer theory is (CO4, K4) 1

(a) Mass function
(b) Membership function
(c) Belief function
(d) Probability function

2. Attempt all parts:-

2.a.	City engineers want to use smart systems to control traffic flow and reduce electricity waste.State two real-world AI applications that can support Smart City development.(CO1,K2)	2
2.b.	Mention why N-Queens problem is called a constraint problem. (CO2,K2)	2
2.c.	Express “Every student likes AI” using first-order logic.(CO3,K3)	2
2.d.	Specify the difference between inheritance in semantic networks and slot filling in frames.(CO3,K2)	2
2.e.	Differentiate between forward chaining and backward chaining.(CO4, K3)	2

SECTION-B 15

3. Answer any three of the following:-

3-a.	A smart home deploys a vacuum robot. Home layout: S→A,B; A→C; B→D; C→—; D→—. Compare BFS vs. DFS in exploring rooms. Which method saves battery by avoiding redundant exploration?(CO1,K4)	5
3-b.	Apply BFS to solve the 4–3 jug problem with goal state (2,0). Write the sequence of jug states and complexity (CO2,K3)	5
3-c.	Apply step-by-step moves to solve the 3 missionaries and 3 cannibals problem. Write the sequence of safe states. (CO2,K3)	5
3.d.	Explain the architecture of an expert system and illustrate its components with a simple real-life example.”(CO3,K3)	5
3.e.	Elaborate fuzzy set operations with example and also explain about the terminology used in FUZZY systems.(CO4, K4)	5

SECTION-C 20

4. Answer any five of the following:-

4-a.	Solve a Constraint Satisfaction Problem for the Map Coloring task using backtracking and show the complete solution.(CO1,K3)	4
4-b.	Apply IDDFS for a small graph and show the depth-wise node expansions for each iteration.(CO1,K3)	4
4-c.	Demonstrate with an example how alpha beta pruning is less expensive in terms of memory and time as compared to minimax algorithm.(CO2,K4)	4
4-d.	Solve minimax for a given tree of depth 3 and justify each step. (CO2,K3)	4
4-e.	Analyze two advantages and two disadvantages of using expert systems in decision-making.(CO3,K3)	4
4-f.	Evaluate differences between semantic nets and frames in AI knowledge representation. (CO3,K3)	4
4-g.	Prove the Bayesian Theorem. A bag contains 4 balls. Two balls are drawn at	4

.

random without replacement and are found to be blue. What is the probability that all balls in the bag are blue? . (CO4,K4)

4-h. Propose a fuzzy logic model for traffic signal control at a busy intersection. Explain how fuzzy variables like vehicle density and waiting time can be used to optimize signal timing.(CO4, K5) 4