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

B.Tech

SEM: II - 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:-

- | | | |
|-------|--|---|
| (1.1) | Which search strategy guarantees the shortest path in an unweighted graph?[CO1, K1] | 1 |
| | (a) DFS
(b) BFS
(c) Hill Climbing
(d) Greedy Search | |
| (1.2) | Terminal nodes in Minimax contain: [CO2, K1] | 1 |
| | (a) Utility values
(b) Arrays
(c) Graph edges
(d) Colors | |
| (1.3) | Assertion (A): Frames are similar to objects in OOP. Reason (R): Frames support inheritance and structured representation. [CO3,K3] | 1 |
| | (a) Both A and R are true, but R is NOT the correct explanation
(b) Both A and R are true, and R is the correct explanation
(c) A is true, R is false
(d) A is false, R is true | |
| (1.4) | Fuzzy logic system mainly consists of: [CO4, K1] | 1 |
| | (a) CPU, RAM, ROM
(b) Compiler, linker, loader
(c) Fuzzifier, inference engine, defuzzifier
(d) Input, output, storage | |

- (1.5) Rain → WetGrass ← Sprinkler Rain and Sprinkler are: [CO4, K4] 1
- (a) Independent
 - (b) Same
 - (c) Always dependent
 - (d) Dependent

2. Attempt all parts:-

- (2.1) Calculate the total nodes expanded by BFS up to depth 3 for branching factor 5.[CO1, K2] 2
- (2.2) Explain how the Tiles Problem is a state-space search problem. [CO2,K2] 2
- (2.3) Differentiate between universal quantifier and existential quantifier with examples.[CO3,K4] 2
- (2.4) Mention two real-time domains where expert systems are successfully applied.[CO3,K1] 2
- (2.5) Define defuzzification. Why is it required in fuzzy systems? [CO4, K2] 2

SECTION-B

15

3. Answer any three of the following:-

- (3.1) A mobile robot explores a large building. List any two benefits of applying the Iterative Deepening Search (IDS) algorithm for navigation.[CO1,K2] 5
- (3.2) Evaluate the impact of state representation on solving the Water Jug Problem efficiently. [CO2, K5] 5
- (3.3) Which AI concept is mainly used in Missionaries and Cannibals problem? Which algorithm is better for deep searches with limited memory? Name one informed search algorithm.[CO2, K3] 5
- (3.4) Explain predicate logic and discuss the role of predicates, variables, constants, and quantifiers. [CO3,K2] 5
- (3.5) A box contains 90 number plates numbered 1 to 90. If one number plate is drawn at random from the box then find out the probability that: (a) The number is a two-digit number
(b) The number is a perfect square
(c) The number is a multiply of 5. [CO4, K3] 5

SECTION-C

20

4. Answer any five of the following:-

- (4.1) Explain the role of the Heuristic in Search. Justify with an example.[CO1, K3] 4
- (4.2) Differentiate between A* and AO* . [CO1, K3] 4
- (4.3) In a game tree with thousands of possible moves, the system removes branches that will not affect the final result to save computation time. Which technique is applied here? Explain its advantage.[CO2,K2] 4
- (4.4) A company wants to send a delivery vehicle to multiple cities such that each city is visited exactly once with minimum travel cost. Which AI optimization problem is suitable for this application?Justify. [CO2,K2] 4
- (4.5) Explain the Architecture of the Expert System in details.[CO3, K4] 4
- (4.6) A home automation system stores facts such as “If the room is dark, then switch on 4

the light.” Which knowledge representation technique is suitable for representing such true/false statements? Explain briefly.[CO3,K4]

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|-------|---|---|
| (4.7) | Define a Bayesian Network. Mention one application of Bayesian Networks in real life.[CO4,K3] | 4 |
| (4.8) | Define Fuzzy Logic? How is it different from classical Boolean logic?[CO4,K2] | 4 |

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