18341

BRAINWARE UNIVERSITY

Term End Examination 2025-2026
Programme – M.Tech.(CSE)-AIML-2025
Course Name – Artificial Intelligence and Knowledge Representation
Course Code - MTA10403
(Semester I)

Full Marks : 60 **Time : 2:30 Hours**

[The figure in the margin indicates full marks. Candidates are required to give their answers in their own words as far as practicable.]

Group-A

(Multiple Choice Type Question) 1 x 15=15

1. *Choose the correct alternative from the following :*

(i) Interpret the purpose of defining a research problem.
a) Encourages guessing b) Adds volume
c) Clarifies direction of the study d) Reduces writing effort

(ii) Explain the need for narrowing a research topic.
a) Reduces creativity b) Increases confusion
c) Enhances focus and clarity d) Hinders exploration

(iii) Analyze a problem formulation that lacks direction.
a) Clarifies methodology b) Highlights study focus
c) Causes ambiguity and weak research alignment d) Ensures stronger title

(iv) Describe how BFS explores nodes in search space.
a) Selects random node b) Explores all levels before moving deeper
c) Uses heuristic values d) Goes to max depth first

(v) Interpret the role of a heuristic in informed search.
a) Randomizes node selection b) Predicts outcome of next step
c) Estimates cost to goal d) Skips repeated states

(vi) Build a test case for evaluating 8-queens solution using backtracking.
a) Skip constraints b) Check all positions in each row with diagonal conflicts
c) Move queens randomly d) Choose corner queens

(vii) Explain the role of Alpha-Beta pruning in game trees.
a) Adds more nodes b) Removes unnecessary branches
c) Tracks win percentages d) Explores diagonally

(viii) Interpret the evaluation function in game theory.
a) Assigns numerical value to game states b) Measures code quality

c) Represents grammar rules
d) Stores game history

(ix) Evaluate the limitations of Alpha-Beta pruning in non-deterministic games.

a) Enhances accuracy
b) Fails to prune branches with uncertain outcomes
c) Guarantees optimality
d) Requires fewer moves

(x) Apply domain filtering to eliminate conflicts during search.

a) Assign random values
b) Prune values that violate constraints
c) Ignore variable constraints
d) Choose next variable

(xi) Apply forward checking to a partially assigned CSP.

a) Add new variables
b) Eliminate inconsistent values from unassigned variables
c) Skip assignments
d) Use brute force

(xii) Design a CSP strategy that reduces branching factor.

a) Assign all values up front
b) Use heuristics and forward checking to reduce branching
c) Use no constraints
d) Expand all possibilities

(xiii) Identify a characteristic of procedural knowledge.

a) Static data
b) Defined set of steps
c) Independent facts
d) Truth values

(xiv) Recall the use of first-order logic.

a) Evaluate fuzzy rules
b) Represent relations using predicates and quantifiers
c) Handle uncertainty
d) Operate search algorithms

(xv) Analyze the structural difference between propositional and predicate logic.

a) Both use quantifiers
b) Propositional uses objects; predicate ignores logic
c) Predicate allows quantifiers and variables
d) Propositional is recursive

Group-B

(Short Answer Type Questions) 3 x 5=15

2. Define knowledge representation in Artificial Intelligence. (3)
3. Explain the role of state space in problem-solving. (3)
4. Explain the idea of Laplace smoothing in Bayesian learning. (3)
5. Assess the benefits of using Bayesian networks for decision-making under uncertainty. (3)
6. Construct a problem-solving approach using backtracking and heuristics. (3)

OR

Design a heuristic that can improve solving time for Boolean satisfiability. (3)

Group-C

(Long Answer Type Questions) 5 x 6=30

7. Apply constraint satisfaction to design a solution for the Map Coloring problem. (5)
8. Create a constraint network for solving a crossword puzzle with 5 words. (5)
9. List and explain the types of logic used in AI for knowledge representation. (5)
10. Construct a comparison chart between Greedy BFS and A* Search. (5)
11. Assess the trade-offs between crisp logic and fuzzy logic in AI decision-making. (5)
12. Examine how AI techniques can be evaluated using small-scale problems like Tic-Tac-Toe. (5)

OR

Analyze the importance of formulating real-world problems into solvable AI models. (5)

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