(6 pages) **Reg. No. : .....**

Code No. : 10874 E **Sub. Code : FECL 21/ FECI 21**

B.Sc. (CBCS) DEGREE EXAMINATION, APRIL 2026

Second Semester

Computer Science with Artificial Intelligence and Machine Learning/Computer Science with Artificial Intelligence – Elective

ARTIFICIAL INTELLIGENCE & KNOWLEDGE REPRESENTATION

(For those who joined in July 2025 onwards)

Time : Three hours Maximum : 75 marks

PART A — (10 × 1 = 10 marks)

Answer ALL questions.

Choose the correct answer :

1. AI agents are classified based-on:
   (a) Reactivity and goal orientation
   (b) Neural network depth
   (c) Heuristic evaluation
   (d) Probability update

2. Goal formulation involves: -
   (a) Specifying desired end states
   (b) Defining a reward function
   (c) Initializing Q-values
   (d) Applying dynamic programming

3. Random search is mostly:
   (a) Efficient for large search spaces
   (b) Uninformed and exploratory
   (c) Based on conditional probabilities
   (d) Deterministic

4. Best-first search selects nodes based on:
   (a) Random probability
   (b) Evaluation function or heuristic value
   (c) Depth of tree
   (d) Breadth-level

5. Probability theory helps AI systems to:
   (a) Handle uncertainty
   (b) Minimize memory usage
   (c) Store patterns in Hopfield networks
   (d) Optimize Q-values

6. Bayesian networks represent:
   (a) Probabilistic dependencies among variables
   (b) Only sequential decision steps
   (c) Search trees
   (d) Reinforcement utilities

7. Active reinforcement learning requires
   (a) Exploration to improve policies
   (b) Passive utility estimation
   (c) Bayesian inference
   (d) Only direct reward computation

8. Adaptive dynamic programming differs from direct utility estimation in that it:
   (a) Requires a model of environment transitions
   (b) Estimates values from sampling only
   (c) Uses random search
   (d) Computes probabilities

9. Hopfield networks are examples of:
   (a) Recurrent neural networks
   (b) Feedforward networks
   (c) A* search structures
   (d) Bayesian networks

10. Distributed reasoning allows:
   (a) Multiple agents to cooperate for problem-solving
   (b) Random search in state space
   (c) Only passive learning
   (d) Single-agent heuristic evaluation

PART B — (5 × 5 = 25 marks)

Answer ALL questions, choosing either (a) or (b).

Each answer should not exceed 250 words.

11. (a) Assess problem formulation's impact on AI solutions.

Or

   (b) Differentiate agent architectures based on environment interaction.

12. (a) Compare depth-first and breadth-first search efficiency in memory and time.

Or

   (b) Illustrate heuristic search on a simple optimization problem.

13. (a) Construct a Bayesian Network for weather prediction.

Or

(b) Interpret probabilistic dependencies in the given network.

14. (a) Apply passive reinforcement learning in a simple board game.

Or

(b) Contrast Q-learning with temporal difference learning approaches.

15. (a) Examine advantages of parallelism in reasoning systems.

Or

(b) Justify using distributed neural networks for complex tasks.

PART C — (5 × 8 = 40 marks)

Answer ALL questions, choosing either (a) or (b).

Each answer should not exceed 600 words.

16. (a) Analyze the evolution of AI and Its practical applications.

Or

(b) Design a conceptual model for agent-environment interaction.

17. (a) Predict the effectiveness of different search strategies for a given problem.

Or

(b) Solve a route-planning problem using A* search algorithm.

18. (a) Examine temporal reasoning approaches in sequential decision tasks.

Or

(b) Apply Hidden Markov Models to a given observation sequence and estimate states.

19. (a) Demonstrate Q-learning with a numerical example.

Or

(b) Evaluate strategies for improving policy learning in active reinforcement learning.

20. (a) Analyze distributed AI frameworks in multi-agent coordination.

Or

(b) Illustrate associative memory retrieval in Hopfield networks with examples.

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