



**SCHOOL OF COMPUTER APPLICATIONS
KALINGA INSTITUTE OF INDUSTRIAL TECHNOLOGY (KIIT),
DEEMED TO BE UNIVERSITY**

Question Bank

Subject Code : MC4112

Subject Name : Artificial Intelligence

Course : MCA

- Introduction -

1. Define in your own words: (a) intelligence, (b) artificial intelligence, (c) logical reasoning.
2. Differentiate the Human Brain and Computer.
3. Match the definitions of artificial intelligence organized into four categories - Thinking Humanly, Thinking Rationally, Acting Humanly, and Acting Rationally with the following examples and support your answer with an explanation for each match.
 - (i) A chess-playing AI that consistently defeats human champions.
 - (ii) A medical diagnosis tool that analyzes patient data and accurately suggests potential illnesses.
 - (iii) An AI that composes music by analyzing existing pieces using statistical patterns and associations.
 - (iv) An AI that analyzes historical data and generates realistic historical fiction stories.
 - (v) A spam filter that accurately identifies and blocks unwanted emails.
 - (vi) A factory robot that performs repetitive tasks with high precision and efficiency.
 - (vii) AI can analyze artistic styles and transfer them to different types of images, mimicking an artist's approach.
 - (viii) A social media bot that interacts with other users, posts content, and attempts to blend in with real people.
4. Differentiate the Weak AI and Strong AI.
5. What are the advantages and limits of AI? Give 5 real-life examples where AI is used.
6. Differentiate Rationality and omniscience with example.
7. Are reflex actions (such as flinching from a hot stove) rational? Are they intelligent?
8. What factors determine whether an AI is acting rationally in a given situation?

————— **Intelligent Agents and Environment** —————

1. Differentiate Rational and Intelligent Agent.
2. What do you understand by the term AI environment? How do we specify the task environment?
3. Give a PEAS description for:
 - (i) Taxi- Driver
 - (ii) Medical Diagnosis System
 - (iii) Satellite Image Analysis System
 - (iv) Part-Picking Robot
 - (v) Interactive English Tutor
 - (vi) A chess-playing AI competing against a human opponent.
 - (vii) A music recommendation system
 - (viii) A self-checkout system at a grocery store.
 - (ix) A weather forecasting system
 - (x) A self-driving car navigating a busy city street.
4. Explain the Properties of the Task Environment with examples.
5. Match the following examples of task environments with their characteristics and support your answer with an explanation for each match.
 - (i) Taxi- Driver
 - (ii) Medical Diagnosis System
 - (iii) Satellite Image Analysis System
 - (iv) Part-Picking Robot
 - (v) Interactive English Tutor
 - (vi) Chess with a Clock.
 - (vii) Crossword Puzzle.
 - (viii) Poker Game.
6. What do you understand by the term AI Agent? Explain the building components of an AI agent with the properties of an AI Agent.
7. Explain the Agent function and Agent program.
8. Explain Types of Agents with examples and block diagrams of each type.
9. Match the Type of Agent with the following examples and support your answer with an explanation for each match with the help of their Percept, Action, and Actions.
 - (i) A thermostat.
 - (ii) A self-driving car

- (iii) A chess-playing AI
- (iv) A cleaning robot that navigates to clean an entire room and prioritizes areas with heavier dirt accumulation for more efficient cleaning results.
- (v) Smart Traffic Light.

————— **Solving Problems by Searching** —————

1. What do you mean by a problem-solving agent? Explain the general steps performed by the problem-solving agent to solve any problem.
2. Define the problem with the help of five components of the problem.
3. Explain the types of problems with an example in detail.
4. Define in your own words: (a) State Space, (b) Path in State Space, (c) Solution to the Problem (d) Optimal Solution to the Problem.
5. Explain why problem formulation must follow goal formulation.
6. Formulate the following problems using State Space formulation:
 - (i) Vacuum-Cleaner World
 - (ii) Tic-tac-toe game
 - (iii) 8-puzzle problem
 - (iv) 8-Queens Problem
 - (v) Water Jug Problem
 - (vi) Monkey Banana Problem
 - (vii) Missionaries and Cannibals problem
 - (viii) Tower of Hanoi.
 - (ix) Graph Coloring problem
 - (x) Wolves, Goats, and Cabbage problem.
7. Define in your own words: (a) branching factor, (b) depth of the tree, (c) Successor of a node, (d) Representation of graph and tree.
8. Match the following examples of task environments with their characteristics and support your answer with an explanation for each match.
 - (i) Taxi- Driver
 - (ii) Medical Diagnosis System
 - (iii) Satellite Image Analysis System
 - (iv) Part-Picking Robot
 - (v) Interactive English Tutor
 - (vi) Chess with a Clock.
 - (vii) Crossword Puzzle.

(viii) Poker Game.

9. Consider the following graph. For the following sub-questions, ties are broken in alphabetical order. S is start state and G is goal state.

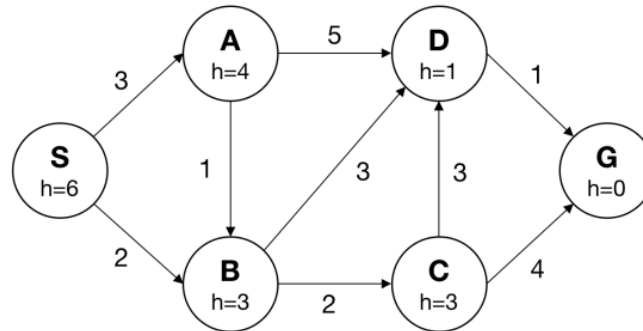


Figure 1: Graph of Question 9.

- (a) What path would DFS return? (b) What path would BFS return? (c) What path would UCS return? (d) A* algorithm (e) Best-First Search
10. Consider the following graph. The numbers written on the edges represent the distance between the nodes. The numbers written on nodes represent the heuristic value. Find the most cost-effective path from the start state A to the final state J using the (a) Best-First Search (b) A* Algorithm.

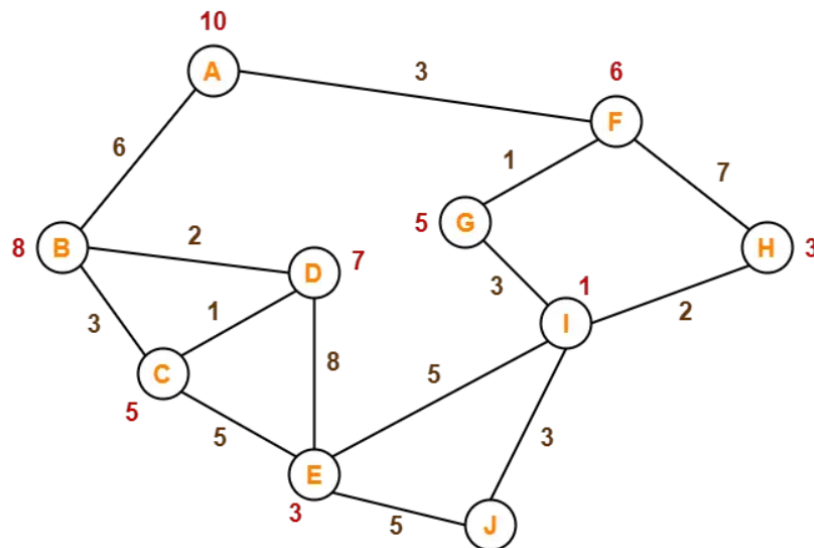


Figure 2: Graph of Question 10.

11. Define in your own words: (a) Completeness, (b) Optimality, (c) Time complexity, (d) Space complexity.
12. Compare the DFS and BFS Strategies.
13. Define the term Heuristic Function. Explain the Admissibility and Consistency properties of the Heuristic Function with the general equation.
14. Explain the Hill-Climbing algorithm with an example. Write the algorithm for the Steepest Ascent Hill-Climbing algorithm. What are the problems in the Hill-Climbing algorithm?