Oral Questions and Answers for AI Experiments

1. Depth First Search (DFS) and Breadth First Search (BFS)

Q: What is DFS and how does it work?

A: DFS stands for Depth First Search. It is a graph traversal algorithm that explores as far as possible along each branch before backtracking. It uses a stack or recursion.

Q: What is BFS and how does it differ from DFS?

A: BFS stands for Breadth First Search. It explores all neighbors at the present depth before moving on to nodes at the next level. It uses a queue, unlike DFS which uses a stack or recursion.

Q: In which scenarios is DFS more useful than BFS?

A: DFS is better for problems that require exploring all paths like puzzle solving, maze problems, and topological sorting.

Q: What data structures are used in DFS and BFS?

A: DFS uses a stack or recursion, while BFS uses a queue.

Q: Can DFS and BFS be used for cycle detection?

A: Yes, both can detect cycles in graphs.

2. A* Algorithm

Q: What is the A* algorithm used for?

A: A* is used for pathfinding and graph traversal, especially in games and maps.

Q: How does A* differ from Dijkstra's algorithm?

A: A* uses heuristics to find the shortest path faster, whereas Dijkstra's explores all paths equally.

Q: What is a heuristic in A*?

A: A heuristic is an estimate of the cost from a node to the goal, helping guide the search.

Q: What is the formula used in A*?

A: f(n) = g(n) + h(n), where g(n) is the cost from start to current node, and h(n) is the estimated cost to the goal.

3. Greedy Algorithm

Q: What is a greedy algorithm?

A: A greedy algorithm makes the locally optimal choice at each step with the hope of finding the global optimum.

Q: Name some applications of greedy algorithms.

A: Selection Sort, Minimum Spanning Tree (Prim's, Kruskal's), Dijkstra's Algorithm, Job Scheduling.

Q: What is Prim's Algorithm?

A: Prim's algorithm finds a Minimum Spanning Tree by starting from a node and adding the shortest edge that connects a visited node to an unvisited one.

Q: How is Kruskal's Algorithm different from Prim's?

A: Kruskal's selects edges in increasing order of weight, avoiding cycles, whereas Prim's builds the MST from one node.

Q: Is Dijkstra's algorithm greedy?

A: Yes, because it always chooses the closest unvisited node.

4. Constraint Satisfaction Problem (CSP)

Q: What is a constraint satisfaction problem?

A: A problem where the goal is to find a solution that satisfies a number of constraints.

Q: What is the N-Queens problem?

A: Placing N queens on an N×N chessboard such that no two queens threaten each other.

Q: What is the difference between Backtracking and Branch and Bound?

A: Backtracking explores all possibilities recursively and backtracks when constraints are violated. Branch and Bound uses bounding functions to eliminate unpromising solutions early.

Q: How does graph coloring relate to CSPs?

A: Graph coloring assigns colors to nodes such that no adjacent nodes have the same color, which is a typical CSP.

5. Chatbot Development

Q: What is a chatbot?

A: A chatbot is a program designed to simulate conversation with users, typically for customer

support.

Q: What are the types of chatbots?

A: Rule-based (predefined responses) and AI-based (use NLP and ML for understanding).

Q: What is NLP?

A: Natural Language Processing, a field of AI that enables machines to understand and respond to human language.

Q: What are common applications of chatbots?

A: Customer service, booking, feedback collection, product suggestions.

Q: What are the limitations of a basic rule-based chatbot?

A: It cannot understand complex queries and responds only to predefined inputs.