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IDC (MOOCs)

Paper : MOOCIDC1013

(Artificial Intelligence: Search Methods
for Problem Solving)

Full Marks : 50

Pass Marks : 20

Time : 2 hours

(Question carries 1 mark each)
Please tick (✓) the correct answer

*Use of correction fluid is prohibited ** Multiple ticks will be treated as incorrect.*

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- Which of the following search strategies guarantees the shortest path in an unweighted graph?**
 - Depth-First Search (DFS)
 - Breadth-First Search (BFS)
 - Best-First Search
 - A* Search
 - In the context of search algorithms, what does 'state space' refer to?**
 - The data structure used for storing the nodes
 - The set of all possible configurations of the problem
 - The number of nodes in the search tree
 - The time complexity of the algorithm
 - Which of the following search algorithms explores the deepest node first?**
 - Depth-First Search (DFS)
 - Breadth-First Search (BFS)
 - Best-First Search
 - A* Search
 - What is the main disadvantage of Depth-First Search (DFS)?**
 - It may not find a solution if one exists
 - It uses a lot of memory
 - It may get stuck in an infinite loop
 - It requires a heuristic function

5. **Which algorithm is used in the uninformed search method that expands all the nodes at the present depth level before moving on to nodes at the next level?**
 - a) Depth-First Search (DFS)
 - b) Breadth-First Search (BFS)
 - c) Iterative Deepening Search
 - d) Uniform Cost Search
6. **In A search, what is used to determine the order in which nodes are expanded?***
 - a) Depth of the node
 - b) The heuristic function ($h(n)$) and the cost function ($g(n)$)
 - c) The size of the state space
 - d) Random selection
7. **Which search algorithm is optimal and complete when the heuristic used is admissible?**
 - a) Uniform Cost Search
 - b) Depth-First Search
 - c) A* Search
 - d) Breadth-First Search
8. **In the context of search algorithms, what does 'admissible' mean?**
 - a) The heuristic does not overestimate the true cost
 - b) The heuristic is always accurate
 - c) The heuristic guarantees an optimal solution
 - d) The heuristic is less complex
9. **Which of the following search strategies is best used when there is no knowledge about the problem except for the initial and goal states?**
 - a) Best-First Search
 - b) Depth-First Search (DFS)
 - c) Uniform Cost Search
 - d) Breadth-First Search (BFS)
10. **Which of the following is an example of an uninformed search strategy?**
 - a) A* Search
 - b) Greedy Best-First Search
 - c) Depth-First Search
 - d) Iterative Deepening Search
11. **In the context of the search algorithms, what does 'informed search' mean?**
 - a) Search methods using randomness
 - b) Search methods that use additional information (heuristics)
 - c) Search methods that explore all possible states
 - d) Search methods that avoid revisiting nodes

12. Which search algorithm uses a priority queue to select the next node to explore based on path cost?
- a) Depth-First Search (DFS)
 - b) Uniform Cost Search
 - c) A* Search
 - d) Breadth-First Search (BFS)
13. In A search, what does the function $f(n)$ represent?*
- a) The depth of the node
 - b) The total estimated cost of the cheapest solution through n
 - c) The heuristic function alone
 - d) The actual cost from the initial state to n
14. Which of the following is a characteristic of the Breadth-First Search (BFS)?
- a) It requires less memory than DFS
 - b) It guarantees finding the shortest path in an unweighted graph
 - c) It explores the deepest node first
 - d) It is used for solving problems with a small state space
15. What is the main advantage of Iterative Deepening Search (IDS)?
- a) It uses less memory than BFS
 - b) It guarantees finding the shortest path
 - c) It avoids the risk of getting stuck in infinite loops
 - d) It works faster than DFS
16. In the Uniform Cost Search algorithm, the nodes are expanded based on:
- a) The depth of the node
 - b) The total cost of the path to the node
 - c) The heuristic cost of the node
 - d) Random order
17. Which of the following search strategies would be best suited for finding solutions when the path cost is important?
- a) Depth-First Search (DFS)
 - b) Breadth-First Search (BFS)
 - c) Uniform Cost Search
 - d) A* Search
18. Which of the following is the main characteristic of the Uniform Cost Search algorithm?
- a) It explores nodes based on the heuristic value
 - b) It expands the least costly node first
 - c) It uses a depth-first approach
 - d) It guarantees the shortest path without exploring the entire space

19. In the A search algorithm, the function used to evaluate the best node is represented by:*
- a) $f(n) = g(n) + h(n)$
 - b) $f(n) = g(n) - h(n)$
 - c) $f(n) = g(n) * h(n)$
 - d) $f(n) = g(n) / h(n)$
20. What type of search is guaranteed to find a solution, if one exists, but does not guarantee an optimal solution?
- a) A* Search
 - b) Uniform Cost Search
 - c) Greedy Best-First Search
 - d) Depth-First Search
21. Which of the following is an example of an optimal search algorithm?
- a) Uniform Cost Search
 - b) Greedy Best-First Search
 - c) Depth-First Search
 - d) Breadth-First Search
22. In a search algorithm, the term 'goal test' refers to:
- a) The function that checks whether the goal has been reached
 - b) The node that has the highest heuristic value
 - c) The node that will be expanded next
 - d) The method used to backtrack from a solution
23. In the context of A search, the heuristic function $h(n)$ must be:*
- a) Always greater than the actual cost
 - b) A lower bound on the cost from node n to the goal
 - c) A random function
 - d) Always equal to the cost to the goal
24. What is the primary reason for using heuristic functions in search algorithms?
- a) To minimize the search space
 - b) To guarantee the optimal solution
 - c) To find solutions more quickly by estimating costs
 - d) To avoid revisiting nodes
25. Which of the following is true for Depth-First Search (DFS) with respect to its space complexity?
- a) It has an exponential space complexity
 - b) It requires only constant space
 - c) It requires linear space
 - d) It requires logarithmic space

26. **What happens in A search when the heuristic function is not admissible?***
- a) The algorithm will still find the shortest path
 - b) The search will become less efficient, but it still works
 - c) The algorithm will not guarantee an optimal solution
 - d) The heuristic will be ignored
27. **Which of the following search algorithms is particularly useful when the state space is extremely large?**
- a) Depth-First Search (DFS)
 - b) Breadth-First Search (BFS)
 - c) A* Search
 - d) Iterative Deepening Search (IDS)
28. **What is the major drawback of Greedy Best-First Search?**
- a) It does not guarantee the shortest path
 - b) It is very slow in finding solutions
 - c) It is highly memory-intensive
 - d) It guarantees an optimal solution
29. **Which search algorithm can be used to solve a problem that has many different path costs and requires finding the cheapest path to the goal?**
- a) Breadth-First Search
 - b) A* Search
 - c) Greedy Best-First Search
 - d) Uniform Cost Search
30. **In which case does Uniform Cost Search (UCS) outperform A Search?***
- a) When a reliable heuristic is available
 - b) When the problem has no clear goal state
 - c) When all paths have equal cost
 - d) When a depth-first approach is needed
31. **What is the key difference between Greedy Best-First Search and A Search?***
- a) Greedy Best-First Search uses path cost, while A* Search uses only the heuristic
 - b) A* Search considers both path cost and heuristic, while Greedy Best-First Search uses only the heuristic
 - c) A* Search guarantees an optimal solution, while Greedy Best-First Search does not
 - d) Both search strategies are exactly the same in terms of pathfinding
32. **What does it mean for a heuristic function to be 'consistent' in the A search algorithm?***
- a) It is always greater than or equal to the actual cost
 - b) It never overestimates the true cost to the goal
 - c) The heuristic value does not change during the search
 - d) The heuristic guarantees the shortest path

33. Which search strategy is best suited for a problem with many possible states but no clear path cost?
- a) A* Search
 - b) Breadth-First Search
 - c) Depth-First Search
 - d) Greedy Best-First Search
34. In which of the following scenarios does Uniform Cost Search work optimally?
- a) When all paths have the same cost
 - b) When the graph is cyclic
 - c) When the path costs are non-negative
 - d) When the graph is unweighted
35. Which of the following is true for Depth-First Search (DFS) in terms of space complexity?
- a) It requires linear space
 - b) It requires exponential space
 - c) It uses constant space
 - d) It uses logarithmic space
36. What happens if the heuristic in an A search algorithm is not admissible?*
- a) The algorithm will still find the optimal solution
 - b) The algorithm will not guarantee an optimal solution
 - c) The search will be much faster
 - d) The search will become deterministic
37. Which of the following is NOT a characteristic of the Iterative Deepening Depth-First Search (IDDFS)?
- a) It avoids memory overflow
 - b) It combines the advantages of BFS and DFS
 - c) It guarantees an optimal solution for unweighted graphs
 - d) It may expand the same node multiple times
38. Which of the following strategies explores the search space using a heuristic but does not guarantee the optimal solution?
- a) Uniform Cost Search
 - b) A* Search
 - c) Greedy Best-First Search
 - d) Depth-First Search

39. Which of the following search algorithms can handle infinite state spaces?
- a) Breadth-First Search
 - b) Depth-First Search
 - c) A* Search
 - d) Greedy Best-First Search
40. In which type of search is the concept of 'pruning' used to eliminate parts of the search space?
- a) Depth-First Search
 - b) Greedy Search
 - c) A* Search
 - d) All of the above
41. Which of the following search methods is most efficient when the state space is large but the goal is near the root node?
- a) A* Search
 - b) Depth-First Search
 - c) Uniform Cost Search
 - d) Greedy Best-First Search
42. Which search method will perform the same as Breadth-First Search (BFS) when used with an admissible heuristic?
- a) Depth-First Search
 - b) A* Search
 - c) Greedy Best-First Search
 - d) Iterative Deepening Search
43. Which of the following is a feature of the Greedy Best-First Search algorithm?
- a) It considers both the path cost and heuristic value
 - b) It guarantees the shortest path
 - c) It only uses the heuristic to estimate the cost
 - d) It is complete and optimal
44. Which of the following search algorithms is particularly useful when the graph is very deep or infinite but the solution is expected to be found at a shallow depth?
- a) Depth-First Search
 - b) A* Search
 - c) Uniform Cost Search
 - d) Iterative Deepening Search

45. Which search algorithm uses a cost function to guide the search but also ensures optimality by considering path cost and heuristic simultaneously?
- a) Best-First Search
 - b) Uniform Cost Search
 - c) A* Search
 - d) Depth-First Search
46. In the context of A Search, the 'g(n)' function represents:*
- a) The heuristic cost estimate to the goal
 - b) The total cost to reach the goal
 - c) The actual cost to reach node n from the start node
 - d) The estimated cost from node n to the goal
47. Which search strategy is best for finding an optimal path when all states have the same cost?
- a) A* Search
 - b) Breadth-First Search (BFS)
 - c) Greedy Best-First Search
 - d) Uniform Cost Search
48. In the A search algorithm, the 'f(n)' function is computed as:*
- a) $f(n) = g(n) + h(n)$
 - b) $f(n) = h(n) - g(n)$
 - c) $f(n) = g(n) * h(n)$
 - d) $f(n) = g(n) / h(n)$
49. Which of the following is an application of the A Search algorithm?*
- a) Pathfinding in video games
 - b) Solving puzzles like the 8-puzzle
 - c) Finding the shortest route in GPS navigation systems
 - d) All of the above
50. Which search algorithm can be applied to solve puzzles, like the 8-puzzle, where the goal is to arrange tiles in a specific order?
- a) Depth-First Search (DFS)
 - b) A* Search
 - c) Greedy Best-First Search
 - d) Uniform Cost Search
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