ESE ATKT Sep 2020
AoA SE Sem IV CBCGS
Question Bank

1. Under what case of Master's theorem will the recurrence relation of binary search fall?
A. 1
B. 2
C. 3
D. It cannot be solved using master's theorem

2. What is recurrence for worst case of QuickSort and what is the time complexity in Worst case?
A. O(n^2 logn)
B. O(n^2)
C. O(n logn logn)
D. O(nlogn)

3. Consider the problem of searching an element x in an array 'arr[]' of size n. The problem can be solved in O(Logn) time if:
1) Array is sorted
2) Array is sorted and rotated by k. k is given to you and k <= n
3) Array is sorted and rotated by k. k is NOT given to you and k <= n
4) Array is not sorted
A. 1 Only
B. 1 & 2 only
C. 1, 2 and 3 only
D. 1, 2, 3 and 4

4. The time complexity of the normal quick sort, randomized quick sort algorithms in the worst case is
A. $O(n^2)$, O(n log n)
B. $O(n^2)$, $O(n^2)$
C. O(n log n), O(n log n)
D. O(n log n), $O(n^2 \log n)$.

5. How many cases are there under Master's theorem?
A. 2
B. 3
C. 4
D. 5

6. What is time complexity of fun()?

```
int fun(int n)
{
  int count = 0;
  for (int i = n; i > 0; i /= 2)
     for (int j = 0; j < i; j++)
        count += 1;
  return count;
}
```

A. O(n^2)
B. O(nLogn)

C. O(n)
D. O(nLognLogn)

7. We use dynamic programming approach when
A. We need an optimal solution
B. The solution has optimal substructure
C. The given problem can be reduced to the 3-SAT problem
D. It's faster than Greedy

8. Floyd Warshall's Algorithm can be applied on _____
A. Undirected and unweighted graphs
B. Undirected graphs
C. Directed graphs
D. Acyclic graphs

9. Floyd Warshall's Algorithm is used for solving _____
A. All pair shortest path problems
B. Single Source shortest path problems
C. Network flow problems
D. Sorting problems

10. What is the running time of the Floyd Warshall Algorithm?
A. Big-oh(V)
B. Theta(V^2)
C. Big-Oh(VE)
D. Theta(V^3)

11. What happens when a top-down approach of dynamic programming is applied to any problem?
A. It increases both, the time complexity and the space complexity
B. It increases the space complexity and decreases the time complexity.
C. It increases the time complexity and decreases the space complexity
D. It decreases both, the time complexity and the space complexity

12. Which is true statement

A. Kruskal's algorithm is multiple source technique for finding MST.
B. Kruskal's algorithm is used to find minimum spanning tree of graph, time complexity of it is O(EV)
C. Kruskal's algorithm (choose best non cycle edge) is better than Prim's (choose best tree edge)when the graph has relatively few edges.
D. Both a and b

13. The travelling salesman problem can be solved using _____
A. A spanning tree
B. A minimum spanning tree
C. Bellman – Ford algorithm
D. DFS traversal

14. Consider the graph M with 3 vertices. Its adjacency matrix is shown below. Which of the following is true?

$$M = \begin{bmatrix} 0 & 1 & 1 \\ 1 & 0 & 1 \\ 1 & 1 & 0 \end{bmatrix}$$

A. Graph M has no minimum spanning tree
B. Graph M has a unique minimum spanning trees of cost 2
C. Graph M has 3 distinct minimum spanning trees, each of cost 2
D. Graph M has 3 spanning trees of different costs

15. Which of the following is not a branch and bound strategy to generate branches?
A. LIFO branch and bound
B. FIFO branch and bound
C. Lowest cost branch and bound
D. Highest cost branch and bound

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17. How many unique colors will be required for proper vertex coloring of a complete graph having n vertices?

A. 0
B. 1
C. N
D. n!

18. Which data structure is used for implementing a FIFO branch and bound strategy?
A. stack
B. queue
C. array
D. linked list

19. In what manner is a state-space tree for a backtracking algorithm constructed?
A. Depth-first search
B. Breadth-first search
C. Twice around the tree
D. Nearest neighbour first

20. Choose the correct statement from the following:
A. branch and bound is more efficient than backtracking
B. branch and bound is not suitable where a greedy algorithm is not applicable
C. branch and bound divides a problem into at least 2 new restricted sub problems
D. backtracking divides a problem into at least 2 new restricted sub problems

21. The problem of placing n queens in a chessboard such that no two queens attack each other is called as?
A. n-queen problem
B. eight queens puzzle
C. four queens puzzle
D. 1-queen problem

22. What is the worst case running time of Rabin Karp Algorithm?

A. Theta(n)
B. Theta(n-m)
C. Theta((n-m+1)m)
D. Big-Oh(n)

23. Pattern Matching refers to string ----------

A. Searching
B. Matching problem
C. Both a and b
D. none

24. Problems that can be solved in polynomial time are known as?
A. intractable
B. tractable
C. decision
D. complete

25. Which of the following is an NP complete problem?
A. Hamiltonian cycle
B. Travelling salesman problem
C. Calculating chromatic number of graph
D. Finding maximum element in an array