1. What is recurrence for worst case of QuickSort and what is the time complexity in Worst case?

   A Recurrence is T(n) = T(n-2) + O(n) and time complexity is O(n^2)

   B Recurrence is T(n) = T(n-1) + O(n) and time complexity is O(n^2)

   C Recurrence is T(n) = 2T(n/2) + O(n) and time complexity is O(nLogn)

   D Recurrence is T(n) = T(n/10) + T(9n/10) + O(n) and time complexity is O(nLogn)

2. 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)

3. Which of the following sorting algorithms has the lowest worst-case complexity?

   A. Merge Sort

   B. Bubble Sort

   C. Quick Sort

D. Selection Sort

4. Which of the following algorithm design technique is used in finding all pairs of shortest distances in a graph?

   A Dynamic programming

   B Backtracking

   C Greedy

   D Divide and Conquer

5. Dijkstra’s algorithm is based on

   A Divide and conquer paradigm

   B Dynamic programming

   C Greedy Approach

   D Backtracking paradigm

6. Which of the following problems is NOT solved using dynamic programming?
   a) 0/1 knapsack problem
   b) Matrix chain multiplication problem
   c) Edit distance problem
   d) Fractional knapsack problem

7. Of the following given options, which one of the following is a correct option that provides an optimal solution for 4-queens problem?
   a) (3,1,4,2)
   b) (2,3,1,4)
   c) (4,3,2,1)
   d) (4,2,3,1)

8. What is the objective of the knapsack problem?
   a) To get maximum total value in the knapsack
   b) To get minimum total value in the knapsack
   c) To get maximum weight in the knapsack
   d) To get minimum weight in the knapsack

9.Given items as {value,weight} pairs {{40,20},{30,10},{20,5}}. The capacity of knapsack=20. Find the maximum value output assuming items to be divisible.
a) 60
b) 80
c) 100
d) 40

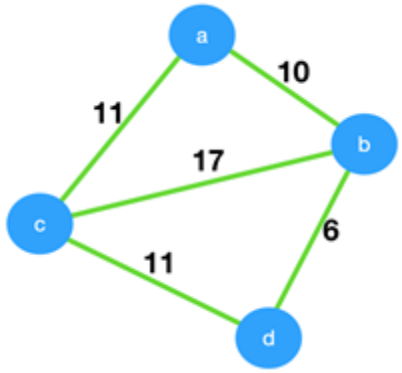
10.Find the longest increasing subsequence for the given sequence:
{10, -10, 12, 9, 10, 15, 13, 14}
a) {10, 12, 15}
b) {10, 12, 13, 14}
c) {-10, 12, 13, 14}
d) {-10, 9, 10, 13, 14}

11.You are given a knapsack that can carry a maximum weight of 60. There are 4 items with weights {20, 30, 40, 70} and values {70, 80, 90, 200}. What is the maximum value of the items you can carry using the knapsack?
a) 160
b) 200
c) 170
d) 90

12.What is a chromatic number?
a) The maximum number of colors required for proper edge coloring of graph
b) The maximum number of colors required for proper vertex coloring of graph
c) The minimum number of colors required for proper vertex coloring of graph
d) The minimum number of colors required for proper edge coloring of graph

13. Which of the following is the most commonly used data structure for implementing Dijkstra’s Algorithm?
a) Max priority queue
b) Stack
c) Circular queue
d) Min priority queue

14. Consider the given graph.



What is the weight of the minimum spanning tree using the Prim's algorithm,starting from vertex a?

a) 23
b) 28
c) 27
d) 11

15. Which of the following is false about Prim's algorithm?

a) It is a greedy algorithm
b) It constructs MST by selecting edges in increasing order of their weights
c) It never accepts cycles in the MST
d) It can be implemented using the Fibonacci heap

16. Consider the following statements.

S1. Kruskal's algorithm might produce a non-minimal spanning tree.
S2. Kruskal's algorithm can efficiently implemented using the disjoint-set data structure.

a) S1 is true but S2 is false
b) Both S1 and S2 are false
c) Both S1 and S2 are true
d) S2 is true but S1 is false

17. 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

18. Given a pattern of length- 5 window, find the valid match in the given text.

Pattern: 2 1 9 3 6
Modulus: 21
Index: 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21

Text: 9 2 7 2 1 8 3 0 5 7 1 2 1 2 1 9 3 6 2 3 9 7

a) 11-16

b) 3-8

c) 13-18

d) 15-20

19 Two main measures for the efficiency of an algorithm are

A. Processor and memory

B. Complexity and capacity

C. Time and space

D. Data and space

20. The concept of order Big O is important because

A. It can be used to decide the best algorithm that solves a given problem

B. It determines the maximum size of a problem that can be solved in a given amount of time

C. It is the lower bound of the growth rate of algorithm

D. Both A and B

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21. Choose the problems that cannot be solved using backtracking approach

A. N queen problem
B. Sum of Subset
C. Graph Coloring
D. All pair shortest path

22. Choose the problems that can be solved using Dynamic Programming

A. Shortest path Dijkstra's algorithm
B. Multistage graph problem
C. All pair shortest path
D. Longest common sequence

23. Which asymptotic notation is used for finding the upper bound of algorithm

A. Big Oh

B. Big Theta
C. Big Omega

24. Which of the following statements is false about time complexity?
A. Time complexity depends on system configuration
B. Time complexity depends on number of programs running
C. Time complexity depends on the size of program
D. Time complexity depends on