

Sample Questions

Computer Engineering / Artificial Intelligence and Data Science / Artificial Intelligence and Machine Learning / Computer Science and Engineering (Artificial Intelligence and Machine Learning) / Computer Science and Engineering (Data Science) / Computer Science and Engineering (Internet of Things and Cyber Security Including Block Chain Technology) / Cyber Security / Data Engineering / Internet of Things (IoT)

Subject Name: Analysis of Algorithm

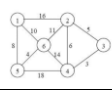
Semester: IV

Multiple Choice Questions

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| | Choose the correct option for following questions. All the Questions are compulsory and carry equal marks |
| 1. | Compare the following functions asymptotically: $F(n)=2^{\log n}$ $G(n)=n^{\sqrt{n}}$ |
| Option A: | $F(n) = G(n)$ |
| Option B: | $F(n) \neq G(n)$ |
| Option C: | $F(n) < G(n)$ |
| Option D: | $F(n) > G(n)$ |
| 2. | Express the complexity of the following algorithm using recurrence relation: Algo (int n) { if (n>0) {for(i=0; i<n; i=i*2) print(i); Algo(n-1); } } |
| Option A: | $T(n)=T(n-1) + \log n$ |
| Option B: | $T(n) = T(n-1) * \log n$ |
| Option C: | $T(n)= T(n/2) + \log n$ |
| Option D: | $T(n)=T(n/2) * \log n$ |
| 3. | Principle of Optimality is applicable to which of the following? |
| Option A: | Fractional Knapsack |
| Option B: | Fibonacci Series |
| Option C: | Minimum Spanning tree |
| Option D: | 15- puzzle problem |
| 4. | Which of the following algorithm does not use divide and conquer design strategy? |
| Option A: | Insertion sort |
| Option B: | Quick sort |

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| Option C: | Max Min algorithm |
| Option D: | Merge Sort |
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| 5. | Which of the following is correct for the Bellman Ford algorithm? |
| Option A: | Allows both negative weight edges and negative cycles |
| Option B: | Does not allow either negative weight edges or negative weight cycles. |
| Option C: | Allows only negative weight cycles. |
| Option D: | Allows negative weight edges, but no negative weight cycles. |
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| 6. | Which of the following is not the subsequence of the following two strings? String1: COMPANION String2: OPINION |
| Option A: | OPON |
| Option B: | ONION |
| Option C: | OPNION |
| Option D: | OPANON |
| | |
| 7. | Which of the following must be satisfied for a problem to be solvable using dynamic programming algorithm? i. Overlapping subproblems ii. Optimal substructure property iii. Recursive definition |
| Option A: | Only i |
| Option B: | Only ii |
| Option C: | Only i and ii |
| Option D: | Only i, ii and iii |
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| 8. | Consider the following code snippet: Bounding function(k,i) { for(j=1 to k-1) { if ((x[j]==i) or (Abs(x[j]-i) ==abs(j-k))) return false; } return true } The above code represents the bounding function for which of the following algorithm? |
| Option A: | Subset sum problem using backtracking |
| Option B: | n-queens using backtracking |
| Option C: | Graph coloring using backtracking |
| Option D: | Subset sum using branch and bound |
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| 9. | Which of the following represent prefix table for the following string in KMP algorithm? P: abcdabcabc |
| Option A: | abcdabcabc ----- 000012310123 |

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| Option B: | abcdabcabc ----- 000012301123 |
| Option C: | abcdabcabc ----- 000012300123 |
| Option D: | abcdabcabc ----- 000012310223 |
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| 10. | Which of the following is correct for branch and bound technique? i. It is BFS generation of problem states ii. It is DFS generation of problem states iii. It is D-search. |
| Option A: | Only i |
| Option B: | Only ii |
| Option C: | Only ii and iii |
| Option D: | Only i, and iii |
| | |
| 11. | Choose the correct option for Kruskal's minimum spanning tree algorithm. i. Algorithm will start with forest of $ V $ vertices. ii. FIND-SET function is used to connect disconnected component iii. A safe edge selected will always connect two different trees in a forest |
| Option A: | Only i |
| Option B: | Only i and ii |
| Option C: | Only i and iii |
| Option D: | All i, ii and iii |
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| 12. | What is the time complexity for the following piece of code? for (i =0; i *i<n; i = i++) { statement;} |
| Option A: | $O(\sqrt{n})$ |
| Option B: | $O(\log_2 n)$ |
| Option C: | $O(\log_3 n)$ |
| Option D: | $O(n^2)$ |
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| 13. | Select the correct option matching application in column A with algorithms in column B Column A 1. Package delivery robot has to deliver a package from point A to point B 2. Internet download manager 3. Airline crew scheduling between multiple legs (multiple flights). Column B a. Knapsack algorithm b. Dijkstra's algorithm c. Travelling salesman d. Prim's algorithm |
| Option A: | 1-a; 2-b; 3-c |

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| Option B: | 1-b; 2-a; 3- c |
| Option C: | 1-c; 2-b; 3-a |
| Option D: | 1-c; 2-d; 3-b |
| 14. | Worst case time complexity for Floyd Warshall is |
| Option A: | $O(n^2)$ |
| Option B: | $O(n^3)$ |
| Option C: | $O(n!)$ |
| Option D: | $O(n \log n)$ |
| 15. | Using insertion sort algorithm on array a as shown below, select the correct option representing output after Pass 3 a[]=[31 59 41 26 43 58] |
| Option A: | 31 41 59 26 43 58 |
| Option B: | 26 31 41 59 43 58 |
| Option C: | 31 59 41 26 43 58 |
| Option D: | 26 31 41 43 59 58 |
| 16. | The worst case time complexity of graph coloring algorithm is? n:number of nodes, m: number of colors. |
| Option A: | $O(n*m)$ |
| Option B: | $O(n^m)$ |
| Option C: | $O(n*m^n)$ |
| Option D: | $O(m*n!)$ |
| 17. | Which of the following is correct definition of NP Hard problems? |
| Option A: | A problem is NP hard if it is NP and it is difficult. |
| Option B: | A problem is NP-hard if all problems in NP are polynomial time reducible to it, and the problem itself is NP |
| Option C: | A problem is NP hard if it is NP and hard. |
| Option D: | A problem is NP-hard if all problems in NP are polynomial time reducible to it, even though it may not be in NP itself. |
| 18. | For the following graph, choose the correct order(s) in which edges are getting selected to form a minimum spanning tree using Kruskal's Algorithm.  |
| Option A: | <1,5>, <2,3>, <2,6>, <3,4>, <5,6 > |
| Option B: | <2,6>, <1,5 >, <2,3>, <5,6 >, < 3,4> |
| Option C: | <3,4>, <5,6>, <2,3>, <1,5>, <2,6> |
| Option D: | <3,4>, <2,3>, <2 ,6>, < 5,6 >, < 1,5 > |
| 19. | Which of the following is true for 0/1 Knapsack problem? i. Can be solved using greedy approach ii. Can be solved using dynamic programming iii. It can be used for resource allocation application. |
| Option A: | Only ii |
| Option B: | Only i and iii |

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| Option C: | Only ii and iii |
| Option D: | All i, ii and iii |
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| 20. | Which of the following is true for Merge sort? i. It uses divide and conquer strategy ii. It is an in place sort iii. Its Complexity is $O(n \log n)$ |
| Option A: | Only i |
| Option B: | Only i and ii |
| Option C: | Only i and iii |
| Option D: | All i, ii and iii |
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| 21. | The number of spanning trees for a graph with n vertices is |
| Option A: | n |
| Option B: | n^2 |
| Option C: | n^{n-2} |
| Option D: | 2^n |
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| 22. | The number of feasible solutions in Greedy method are: |
| Option A: | One |
| Option B: | Zero |
| Option C: | More than one |
| Option D: | Hundred |
| | |
| 23. | The optimal solution for 4-queen problem is |
| Option A: | (2,3,1,4) |
| Option B: | (1,3,2,4) |
| Option C: | (3,1,2,4) |
| Option D: | (2,4,1,3) |
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| 24. | In which technique the previously calculated values are stored in memory |
| Option A: | Dynamic Programming |
| Option B: | Greedy Approach |
| Option C: | Divide and Conquer |
| Option D: | Backtracking |
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| 25. | For the recurrence relation, $T(n) = 3T(n/4) + cn^2$, the solution is |
| Option A: | $O(n)$ |
| Option B: | $O(n^2)$ |
| Option C: | $O(\log n)$ |
| Option D: | $O(n \log n)$ |
| | |
| 26. | Using Quick sort, if the array is already sorted, it will give |
| Option A: | Worst Case |
| Option B: | Average Case |
| Option C: | Best Case |
| Option D: | Average Case or Worst Case |
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| 27. | In KMP algorithm, the prefix table for the pattern P = ababada is |
| Option A: | 1002301 |
| Option B: | 1012301 |
| Option C: | 0012201 |
| Option D: | 0012301 |
| 28. | What is the time complexity for the following piece of code? <pre>for (i =0; i<n; i++) for (j=0; j<n; j++) { statement;}</pre> |
| Option A: | O(n) |
| Option B: | O(logn) |
| Option C: | O(n ²) |
| Option D: | O(nlogn) |
| 29. | For the following graph, choose the correct order(s) in which edges are getting selected to form a minimum spanning tree using Prim's Algorithm. |
| | |
| Option A: | (0-4), (3-5), (0-4), (1-2), (4-5) |
| Option B: | (0-4), (0-1), (1-2), (4-5), (3,5) |
| Option C: | (0-4), (4-5), (5-3), (4-3), (1-2) |
| Option D: | (0-4), (0-1), (1-2), (2-5), (5-3) |
| 30. | The cost of a spanning tree is equal to: |
| Option A: | The sum of costs of the vertices of the tree |
| Option B: | The sum of costs of the edges of the tree |
| Option C: | The sum of costs of the edges of the graph |
| Option D: | The sum of costs of the edges and vertices of the tree |
| 31. | For the given elements 6 4 11 17 2 24 14 using quick sort, what is the sequence after first phase, assuming the pivot as the first element? |
| Option A: | 2 4 6 17 11 24 14 |
| Option B: | 2 4 6 11 17 14 24 |
| Option C: | 4 2 6 17 11 24 14 |
| Option D: | 2 4 6 11 17 24 14 |
| 32. | Which of the following is not the subsequence of the following two strings? String1: ENGINEERING String2: NITRING |
| Option A: | NING |

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| Option B: | NRING |
| Option C: | NIRING |
| Option D: | NIARNG |
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| 33. | The worst case time complexity of Quick sort is |
| Option A: | $O(n^2)$ |
| Option B: | $O(n^3)$ |
| Option C: | $O(n \log n)$ |
| Option D: | $O(n)$ |
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| 34. | Which of the following is not an example of backtracking? |
| Option A: | N-queen problem |
| Option B: | 15-puzzle problem |
| Option C: | Sum of Subset problem |
| Option D: | Graph coloring problem |
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| 35. | Which strategy is used in Job sequencing with deadlines? |
| Option A: | Backtracking |
| Option B: | Greedy Strategy |
| Option C: | Dynamic Programming |
| Option D: | Branch and Bound |
| | |
| 36. | Given items as {value, weight} pairs $\{\{80,40\}, \{60,20\}, \{40,10\}\}$. The capacity of knapsack = 40. Find the maximum profit value assuming that the items can be fractioned |
| Option A: | 80 |
| Option B: | 120 |
| Option C: | 105 |
| Option D: | 160 |
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| 37. | Out of the given complexities of 4 different algorithms, which algorithm complexity is faster? |
| Option A: | $O(n)$ |
| Option B: | $O(\log n)$ |
| Option C: | $O(n^2)$ |
| Option D: | $O(2^n)$ |
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| 38. | Match problem statement in Part A with the algorithm in Part B: Part A: <ol style="list-style-type: none"> 1. Single source - multiple destinations shortest path 2. Single source - single destination shortest path 3. All-pair shortest path Part B: <ol style="list-style-type: none"> a. Floyd-Warshall algorithm b. Disjkstra's algorithm c. Multistage graphs |
| Option A: | 1-a, 2-b, 3-c |

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| Option B: | 1-c, 2-b, 3-a |
| Option C: | 1-b, 2-c, 3-a |
| Option D: | 1-b, 2-a, 3-c |
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| 39. | What will be the output after pass 2 for the following elements using selection sort? 61, 42, 19, 74, 25, 15, 54 |
| Option A: | 15, 19, 42, 74, 25, 61, 54 |
| Option B: | 15, 19, 25, 42, 54, 61, 74 |
| Option C: | 15, 19, 61, 42, 74, 25, 54 |
| Option D: | 61, 19, 42, 74, 25, 15, 54 |
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| 40. | Bellman Ford algorithm is used to find out single source shortest path for negative edge weights. Bellman Ford algorithm uses which of the following strategy? |
| Option A: | Greedy method |
| Option B: | Dynamic Programming |
| Option C: | Backtracking |
| Option D: | Divide and Conquer |
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| 41. | We can solve any recurrence by using Master's theorem. |
| Option A: | True |
| Option B: | False |
| Option C: | Can't Say |
| Option D: | Not always |
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| 42. | Indicate constant time complexity in terms of Big-O notation. |
| Option A: | $O(n)$ |
| Option B: | $O(1)$ |
| Option C: | $O(\log n)$ |
| Option D: | $O(n^2)$ |
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| 43. | What is the time complexity for the following piece of code? for (i =0; i<n; i++) for (j=0; j<n; j++) { statement;} |
| Option A: | $O(n)$ |
| Option B: | $O(\log n)$ |
| Option C: | $O(n^2)$ |
| Option D: | $O(n \log n)$ |
| | |
| 44. | Choose the correct option for Kruskal's minimum spanning tree algorithm. i. Algorithm will start with forest of $ V $ vertices. ii. FIND-SET function is used to connect disconnected component A safe edge selected will always connect two different trees in a forest |
| Option A: | Only i |
| Option B: | Only i and ii |

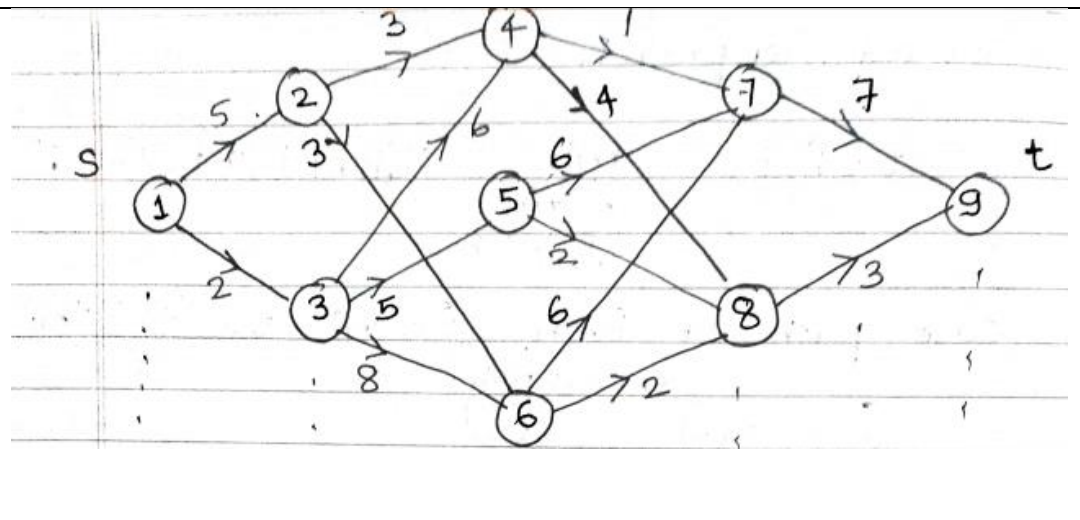
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| Option C: | Only i and iii |
| Option D: | All i, ii and iii |
| | |
| 45. | <p>Select the correct option matching application in column A with algorithms in column B</p> <p>Column A</p> <ol style="list-style-type: none"> 1. Package delivery robot has to deliver a package from point A to point B 2. Resource Allocation Problem 3. Laying a telephone cable in an area with minimum cost <p>Column B</p> <ol style="list-style-type: none"> a. Knapsack algorithm b. Dijkstra's algorithm c. Travelling salesman d. Prim's algorithm |
| Option A: | 1-a; 2-b; 3-c |
| Option B: | 1-b; 2-a; 3-d |
| Option C: | 1-c; 2-b; 3-a |
| Option D: | 1-c; 2-d; 3-b |
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| 46. | Worst case time complexity for Floyd Warshall is |
| Option A: | $O(n^2)$ |
| Option B: | $O(n^3)$ |
| Option C: | $O(n!)$ |
| Option D: | $O(n \log n)$ |
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| 47. | Which of the following algorithm can be used to compute the global optimal profit value? |
| Option A: | 0/1 knapsack |
| Option B: | Fractional knapsack |
| Option C: | Job Sequencing |
| Option D: | Bellman Ford |
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| 48. | Which of the following is true for 0/1 Knapsack problem? |
| | <ol style="list-style-type: none"> i. Can be solved using greedy approach ii. Can be solved using dynamic programming |
| Option A: | Only ii |
| Option B: | Only i |
| Option C: | Both i and ii |
| Option D: | Neither i nor ii |
| | |
| 49. | Following data structure is used to implement LIFO Branch and Bound Strategy |
| Option A: | Priority Queue |
| Option B: | array |
| Option C: | stack |
| Option D: | Linked list |
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| 50. | Pre-processing time of Rabin and Karp Algorithm is |

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| Option A: | $\theta(m^2)$ |
| Option B: | $\theta(m \log n)$ |
| Option C: | $\theta(m)$ |
| Option D: | $O(n)$ |
| | |
| 51. | The solution of the recurrence $T(n) = 4T(n/2) + n$ is |
| Option A: | $O(n^2)$ |
| Option B: | $O(n \log^2 n)$ |
| Option C: | $O(n \log n)$ |
| Option D: | $O(n^3)$ |
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| 52. | How many cases are there under Master's theorem? |
| Option A: | 2 |
| Option B: | 3 |
| Option C: | 4 |
| Option D: | 5 |
| | |
| 53. | Using Quick sort, if the array is already sorted, it will give |
| Option A: | Worst Case |
| Option B: | Average Case |
| Option C: | Best Case |
| Option D: | Average Case or Worst Case |
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| 54. | Which of the following problem can be solved using greedy approach? |
| Option A: | N-queens problem |
| Option B: | All pairs shortest path problem |
| Option C: | Single source shortest path |
| Option D: | Multistage graph problem |
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| 55. | Principle of Optimality is applicable to which of the following? |
| Option A: | Fractional Knapsack |
| Option B: | Fibonacci Series |
| Option C: | Minimum Spanning tree |
| Option D: | 15- puzzle problem |
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| 56. | Which of the following algorithm uses dynamic programming design strategy? |
| Option A: | Insertion sort |
| Option B: | Quick sort |
| Option C: | All pairs shortest path |
| Option D: | N-queens problem |
| | |
| 57. | Which of the following is correct for the Bellman Ford algorithm? |
| Option A: | Allows both negative weight edges and negative cycles |
| Option B: | Does not allow either negative weight edges or negative weight cycles. |
| Option C: | Allows only negative weight cycles. |
| Option D: | Allows negative weight edges, but no negative weight cycles. |
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| 58. | Which of the following must be satisfied for a problem to be solvable using dynamic programming algorithm? i. Overlapping subproblems ii. Optimal substructure property iii. Recursive definition |
| Option A: | Only i |
| Option B: | Only ii |
| Option C: | Only i and ii |
| Option D: | Only i, ii and iii |
| 59. | _____ strategy is used to solve N-Queen Problem |
| Option A: | Greedy Method |
| Option B: | Backtracking |
| Option C: | Divide and Conquer |
| Option D: | Dynamic Programming |
| 60. | Which Graph Traversal method is used to construct State-space tree in backtracking? |
| Option A: | Depth First Search |
| Option B: | Breadth First Search |
| Option C: | Nearest Neighbor First |
| Option D: | Twice around the tree |

Descriptive Questions

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| 1 | Given the following recurrence relation, find its complexity using recursion tree method. $T(n)=c$; if $n=1$ $=2 * T(n/2) + cn$; otherwise |
| 2 | Sort the following array using quicksort algorithm. [40,11,4,72,17,2,49] |
| 3 | Explain subset sum problem using backtracking approach with the help of state space tree. |
| 4 | Consider assembly line scheduling problem with following specifications: $e1=2, e2=4, x1=3, x2=2,$ $a1=\{7,9,3,4,8,4\}, a2=\{8,5,6,4,5,7\}, t1=\{2,3,1,3,4\}, t2=\{2,1,2,2,1\}$ What will be the minimum time from start to station 3 on assembly line 1. |
| 5 | Write a short note on Rabin Karp algorithm. |
| 6 | Explain the characteristics of dynamic programming approach with the help of Floyd-Warshall algorithm. |
| 7 | Consider following multistage graph. Write a backward approach algorithm for computing the cost from source node s to target node t. Also Compute the cost from s to t using backward approach. |



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| 8 | Explain Dijkstra's Single source shortest path algorithm. Explain how it is different from Bellman Ford algorithm. Explain 15-puzzle problem using LC search technique. |
| 9 | Write short note on divide and conquer strategy |
| 10 | Define: P, NP, NP-complete, NP-Hard |
| 11 | Compare Bellman Ford algorithm with Dijkstra's algorithm. |
| 12 | Apply dynamic programming approach to compute the maximum profit for the following instance of knapsack problem. N= 4, Profit= {1,2,5,6}, Weight = {2,3,4,5} |
| 13 | Write a short note on job sequencing with deadline. |
| 14 | What is backtracking? Explain how it is applicable to Graph coloring problem? |
| 15 | Explain the different asymptotic notations with graphs. |
| 16 | Explain multistage graph problem with suitable example. |
| 17 | What is minimum spanning tree. Explain Prim's algorithm for computing minimum spanning tree. |
| 18 | Sort the following elements using quick sort: 74, 25, 14, 66, 84, 53, 30, 48 |
| 19 | Write the Kruskal's algorithm for minimum spanning tree. What is the complexity of Kruskal's algorithm? |
| 20 | Explain Branch and Bound with Travelling salesperson problem. |
| 21 | Explain the different asymptotic notations with graphs. |
| 22 | Explain multistage graph problem with suitable example. |
| 23 | What is minimum spanning tree. Explain Prim's algorithm for computing minimum spanning tree. |
| 24 | Write algorithm for binary search. Explain the algorithm with example |
| 25 | Solve the following using master method: i. $T(n) = 8T(n/2) + n^2$ ii. $T(n) = 4T(n/2) + n \log n$ |
| 26 | Explain the difference between greedy approach and dynamic programming approach. |
| 27 | Determine the LCS of the following sequences: X: {A, B, C, B, D, A, B} Y: {B, D, C, A, B, A} |
| 28 | Write a short note on Bellman Ford Algorithm. |

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| 29 | Explain and apply Naïve string matching on following strings String1: COMPANION String2: PANI |
| 30 | Explain the different methods used to solve recurrence equations. |
| 31 | Explain Single source shortest path algorithm using dynamic programming approach. Explain how it is different from Dijkstra's greedy approach. |
| 32 | Explain assembly line scheduling problem with example. |
| 33 | Write an algorithm to find min and max number using divide and conquer strategy. |
| 34 | Write a short note on All pairs shortest path algorithm. |
| 35 | Rewrite and Compare Rabin Karp and Knuth Morris Pratt Algorithms |