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

	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)!=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);
	}
	}

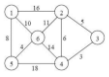
Option A:	T(n)=T(n-1) + log n
Option B:	T(n) =T(n-1) * log n
Option C:	T(n)= T(n/2) + log n
Option D:	T(n)=T(n/2) * log n
3.	Principle of Optimality is applicable to which of the following?
Option A:	Fractional Knapsack
Option B:	Fibonacci Series
Option C:	Minimum Spanning tree
Option D:	15- puzzle problem
4.	Which of the following algorithm does not use divide and conquer design strategy?
Option A:	Insertion sort

Option B:	Quick sort
Option C:	Max Min algorithm
Option D:	Merge Sort
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.
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

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
9.	Which of the following represent prefix table for the following string in KMP algorithm?

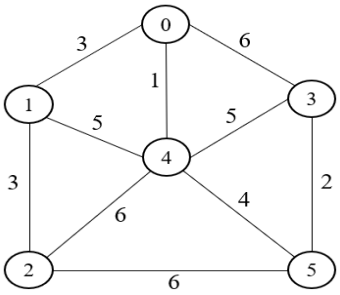
	P: abcdabcbcabc
Option A:	abcdabcbcabc ---------- 000012310123
Option B:	abcdabcbcabc ---------- 000012301123
Option C:	abcdabcbcabc ---------- 000012300123
Option D:	abcdabcbcabc ---------- 000012310223
10.	Which of the following is correct for branch and bound technique? i. It is BFS generation of 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
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:	$O(n^2)$
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
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(nlogn)
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
Option C:	Only ii and iii
Option D:	All i, ii and iii
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(nlogn)
Option A:	Only i
Option B:	Only i and ii
Option C:	Only i and iii
Option D:	All i, ii and iii
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
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)
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
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(logn)
Option D:	O(nlogn)
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
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?
	for (i =0; i<n; i++)
	for (j=0; j<n; j++)
	{ statement;}

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
Option B:	NRING
Option C:	NIRING
Option D:	NIARNG
33.	The worst case time complexity of Quick sort is
Option A:	$O(n^2)$
Option B:	$O(n^3)$
Option C:	O(nlogn)
Option D:	O(n)
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
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
37.	Out of the given complexities of 4 different algorithms, which algorithm complexity is faster?

Option A:	O(n)
Option B:	O(logn)
Option C:	$O(n^2)$
Option D:	$O(2^n)$
38.	Match problem statement in Part A with the algorithm in Part B: Part A: 1. Single source - multiple destinations shortest path 2. Single source - single destination shortest path 3. All-pair shortest path Part B: a. Floyd-Warshall algorithm b. Disjkstra's algorithm c. Multistage graphs
Option A:	1-a, 2-b, 3-c
Option B:	1-c, 2-b, 3-a
Option C:	1-b, 2-c, 3-a
Option D:	1-b, 2-a, 3-c
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
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
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
42.	Indicate constant time complexity in terms of Big-O notation.
Option A:	O(n)
Option B:	O(1)
Option C:	O(logn)
Option D:	O(n2)

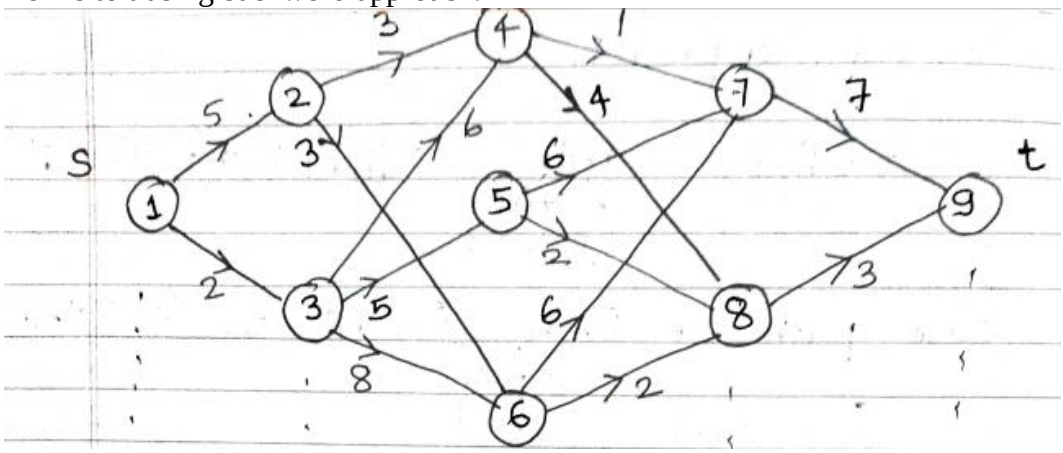
43.	What is the time complexity for the following piece of code?
	for (i =0; i<n; i++)
	for (j=0; j<n; j++)
	{ statement;}

Option A:	O(n)
Option B:	O(logn)
Option C:	$O(n^2)$
Option D:	O(nlogn)
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
Option C:	Only i and iii
Option D:	All i, ii and iii
45.	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. Resource Allocation Problem 3. Laying a telephone cable in an area with minimum cost Column B 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
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(nlogn)
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
48.	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
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
50.	Pre-processing time of Rabin and Karp Algorithm is
Option A:	$\theta(m^2)$
Option B:	θ (mlogn)
Option C:	θ (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 logn)
Option D:	O(n^3)
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
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
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
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.
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

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 backword approach algorithm for computing the cost from soursce node s to target node t. Also Compute the cost from s to t using backword approach. 
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.
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