

بِسْمِ اللَّهِ الرَّحْمَنِ الرَّحِيمِ

In the Name of Allāh, the Most Gracious, the Most Merciful

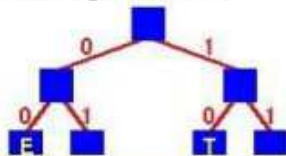
Paper Pattern

MCQS 40 each 1 mark
Short 4 each 2 marks
Short 4 each 3 marks
long 4 each 5 marks

Question No : 1 of 52

Marks: 1 (Budgeted Time 1 Min)

Consider the following Huffman Tree



Answer (Please select your correct option)

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☐ 10 00 010

correct

☐ 011 00 010

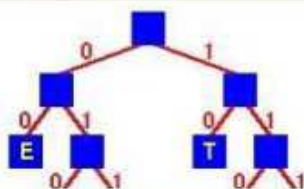
☐ 10 00 110

☐ 11 10 110

Made by: Waqar Siddhu

Question No : 1 of 52

Marks: 1 (Budgeted Time 1 Min)



Answer (Please select your correct option)

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☐ 10 00 010

correct

☐ 011 00 010

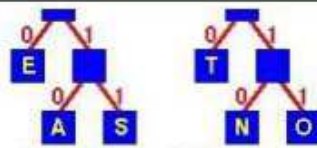
☐ 10 00 110

☐ 11 10 110

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Question No : 1 of 52

Marks: 1 (Budgeted Time 1 Min)



The binary code for the string "TEA" is

Answer (Please select your correct option)

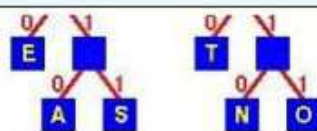
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☐ 10 00 010correct☐ 011 00 010☐ 10 00 110☐ 11 10 110

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Question No : 1 of 52

Marks: 1 (Budgeted Time 1 Min)



The binary code for the string "TEA" is

Answer (Please select your correct option)

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☐ 10 00 010correct☐ 011 00 010☐ 10 00 110☐ 11 10 110

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Question No : 2 of 52

Marks: 1 (Budgeted Time 1 Min)

What is generally true of Adjacency List and Adjacency Matrix representations of graphs?

Answer (Please select your correct option)

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☐ Lists require less space than *matrices* but take longer to find the weight of an edge $(v1,v2)$ correct☐ Lists require less space than *matrices* and they are faster to find the weight of an edge $(v1,v2)$ ☐ Lists require more space than *matrices* and they take longer to find the weight of an edge $(v1,v2)$ ☐ Lists require more space than *matrices* but are faster to find the weight of an edge $(v1,v2)$

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Question No : 3 of 52

Marks: 1 (Budgeted Time 1 Min)

If a graph has v vertices and e edges then to obtain a spanning tree we have to delete

Answer (Please select your correct option)

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☐ v edges.

☐ $v - e + 5$ edges

☐ $v + e$ edges.

☐ None of these
correct

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Question No : 4 of 52

Marks: 1 (Budgeted Time 1 Min)

The Huffman algorithm finds a (n) _____ solution.

Answer (Please select your correct option)

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☐ Optimal

☐ Non-optimal

☐ Exponential

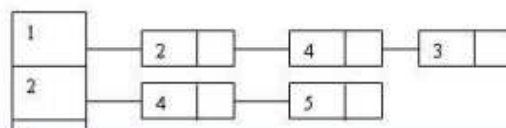
☐ Polynomial
correct

Made by: Waqar Siddhu

Question No : 5 of 52

Marks: 1 (Budgeted Time 1 Min)

Consider the following adjacency list



Answer (Please select your correct option)

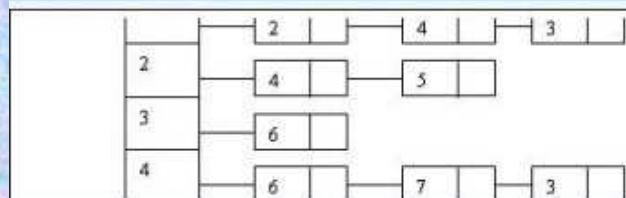
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correct

Made by: Waqar Siddhu

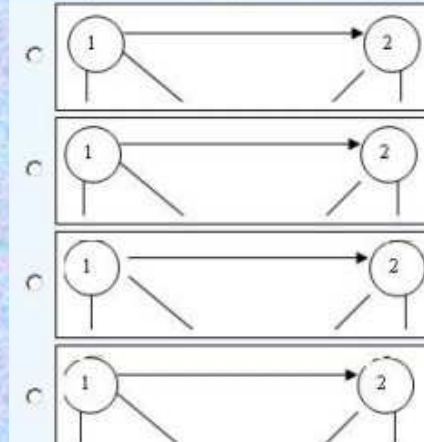
Question No : 5 of 52

Marks: 1 (Budgeted Time 1 Min)



Answer (Please select your correct option)

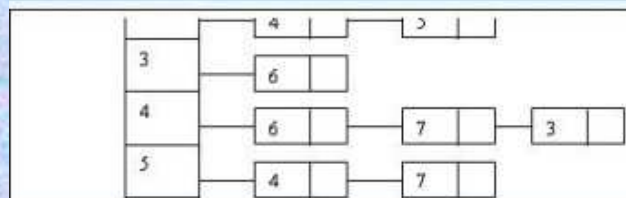
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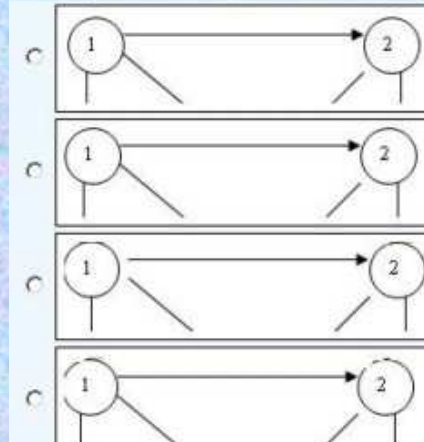
Question No : 5 of 52

Marks: 1 (Budgeted Time 1 Min)



Answer (Please select your correct option)

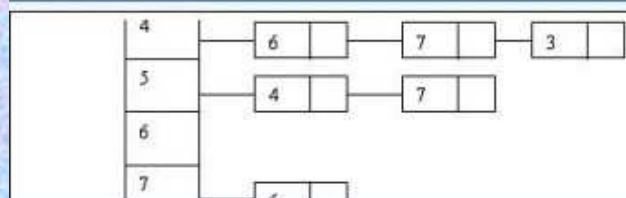
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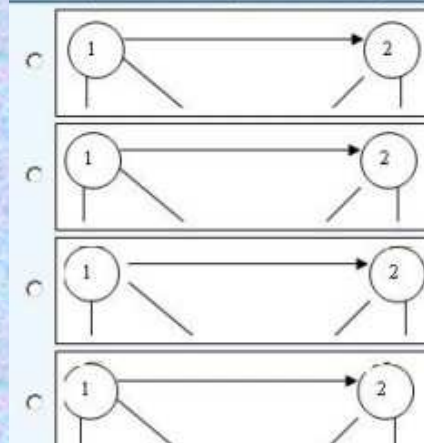
Question No : 5 of 52

Marks: 1 (Budgeted Time 1 Min)



Answer (Please select your correct option)

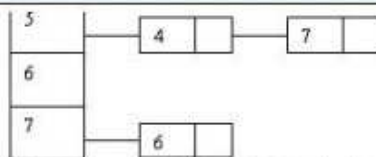
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Question No : 5 of 52

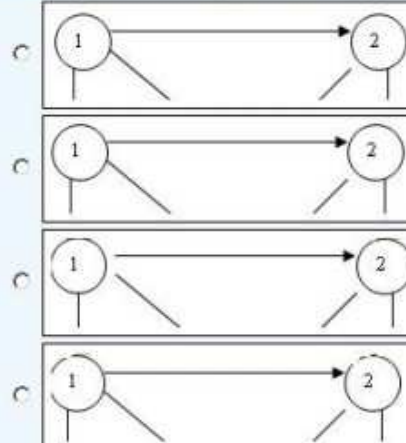
Marks: 1 (Budgeted Time 1 Min)



Which of the following graph(s) describe(s) the above adjacency list?

Answer (Please select your correct option)

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Question No : 6 of 52

Marks: 1 (Budgeted Time 1 Min)

_____ is a graphical representation of an algorithm

Answer (Please select your correct option)

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- ☐ Σ notation
- ☐ Θ notation
- ☐ Flowchart
- ☐ Asymptotic notation

correct

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Question No : 7 of 52

Marks: 1 (Budgeted Time 1 Min)

Identify the maximal points in given set, according to 2-D maxima (the points that are NOT dominated by other points).

 $\{(2,5), (4,4), (4,11), (5,1), (7,7), (7,13), (9,10), (11,5), (12,12), (13,3), (14,10), (15,7)\}$ not sure

Answer (Please select your correct option)

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- ☐ $\{(7,13), (12,12), (14,10), (15,7)\}$
- ☐ $\{(7,7), (7,13), (9,10), (11,5), (14,10)\}$
- ☐ $\{(2,5), (4,4), (4,11), (5,1), (14,10)\}$
- ☐ $\{(4,4), (4,11), (7,13), (9,10), (14,10)\}$

correct

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Question No : 8 of 52

Marks: 1 (Budgeted Time 1 Min)

What will be result of the following recurrence relation?

$$T(n) = \begin{cases} 4 & \text{if } n = 1 \\ T(n/5) + 3n^2 & \text{if } n \text{ is divisible by } 5 \end{cases}$$

Then T(5) is

Answer (Please select your correct option)

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☐ 25☐ 75☐ 79☐ 70

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Question No : 9 of 52

Marks: 1 (Budgeted Time 1 Min)

When we call heapify then at each level the comparison performed takes time

Answer (Please select your correct option)

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☐ It will take $\Theta(1)$ correct☐ Time will vary according to the nature of input data☐ It can not be predicted☐ It will take $\Theta(\log n)$

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Question No : 10 of 52

Marks: 1 (Budgeted Time 1 Min)

Who invented Quick sort procedure?

Answer (Please select your correct option)

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☐ Hoarecorrect☐ Sedgewick☐ Mellroy☐ Coreman

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Question No : 11 of 52

Marks: 1 (Budgeted Time 1 Min)

The main shortcoming of counting sort is that it is useful for

The main shortcoming of counting sort is that it is useful for small integers.

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Answer (Please select your correct option)

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☐ Small Integers

correct

☐ Small characters

☐ Floats

☐ None of these

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Question No : 12 of 52

Marks: 1 (Budgeted Time 1 Min)

A product of matrices is _____ if it is either single matrix or the product of two matrix products, surrounded by parentheses.

not sure

Answer (Please select your correct option)

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☐ Fully parenthesized

correct

☐ Partially parenthesized

☐ Not parenthesized

☐ None of the options

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Question No : 13 of 52

Marks: 1 (Budgeted Time 1 Min)

Maximum number of edges in a Directed Graph may be

Answer (Please select your correct option)

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☐ V

☐ 2V

☐ Approximatly $|V|^2$

correct

☐ $V/2$

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Question No : 14 of 52

Marks: 1 (Budgeted Time 1 Min)

If we encode and compress text using ASCII standard each character is represented by

Answer (Please select your correct option)

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☐

Fixed length codeword of 4 bits

☐

Variable length codeword up to 4 bits

☐

Variable length codeword up to 8 bits

☐

Fixed length codeword of 8 bits

correct

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Question No : 15 of 52

Marks: 1 (Budgeted Time 1 Min)

The Huffman Coding uses

101

Answer (Please select your correct option)

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☐

Prefix property that code words are not matched at ends

☐

No prefix property it has its own method to store the codes

☐

Prefix property that no code word is prefix of any other code

correct

☐

Prefix property that no code words at same level of tree are prefix at other levels

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Question No : 16 of 52

Marks: 1 (Budgeted Time 1 Min)

In directed graphs the cardinality of edges $|E| =$

Answer (Please select your correct option)

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☐

Sum of out-degrees of all the vertices

☐

Sum of in-degrees of all the vertices

☐

First both are true

correct

☐

There is no relation between degree of vertices and no of edges

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Question No : 17 of 52

Marks: 1 (Budgeted Time 1 Min)

A Hamiltonian cycle is a cycle

Answer (Please select your correct option)

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☐

that visits every vertex in the graph exactly once

correct

☐

that visits both vertex and edge exactly once

☐

that visits all vertices without any constraint

☐

that visits every edge in the graph exactly once

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Question No : 18 of 52

Marks: 1 (Budgeted Time 1 Min)

In generic graph traversal algorithm we

Answer (Please select your correct option)

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☐

put vertices in the bag data structure

☐

put edges in the bag data structure

correct

☐

put edges in stack data structure

☐

put vertices in the stack data structure

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Question No : 19 of 52

Marks: 1 (Budgeted Time 1 Min)

In time stamp traversal we can calculate

Answer (Please select your correct option)

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☐

whether the graph has Cycles

correct

☐

total number of cycles on the bases of forward edges

☐

total number of cycles on the bases if back edges

☐

total no of paths of certain length

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Question No : 20 of 52

Marks: 1 (Budgeted Time 1 Min)

Precedence constraint graph is

Answer (Please select your correct option)

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- ☐ non acyclic directed graph
- ☐ acyclic undirected graph
- ☐ non acyclic undirected graph
- ☐ acyclic directed graph

correct

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Question No : 21 of 52

Marks: 1 (Budgeted Time 1 Min)

In Prim's algorithm, the additional information maintained by the algorithm is

not sure

Answer (Please select your correct option)

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- ☐ the length of the shortest path from vertex v to the vertex u
- ☐ the length of the shortest edge from vertex v to points already in the tree
- ☐ the dynamic programming rules
- ☐ the information about all adjacent vertices

correct

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Question No : 22 of 52

Marks: 1 (Budgeted Time 1 Min)

Bellman Ford algorithm is for the

Answer (Please select your correct option)

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- ☐ single source shortest path finding problem and does allow negative cycles
- ☐ single source shortest path finding problem and does allow negative edges and negative cycles
- ☐ multiple-source shortest path finding problem and does allow negative edges
- ☐ single source shortest path finding problem and does allow negative edges

correct

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Question No : 23 of 52

Marks: 1 (Budgeted Time 1 Min)

Which of the following is not true about Dijkstra's algorithm?

Answer (Please select your correct option)

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- ☐ The length of the shortest path to the start vertex is always zero
- ☐ It can find the shortest paths to all other vertices in the same worst case time that it needs to find the shortest path to a single vertex
- ☐ It will work on any weighted graph with positive weights
- ☐ The running time of Bellman - Ford Algorithm is greater than Dijkstra's algorithm

correct

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Question No : 24 of 52

Marks: 1 (Budgeted Time 1 Min)

Kruskal's Algorithm is used for

Answer (Please select your correct option)

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- ☐ calculating shortest path problem
- ☐ calculating Minimum spanning tree
- ☐ shortest and Minimum Spanning tree both can be calculated by it
- ☐ single source shortest path problems

correct

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Question No : 25 of 52

Marks: 1 (Budgeted Time 1 Min)

Dijkstra's algorithm is used for

Answer (Please select your correct option)

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- ☐ calculating multiple source shortest path problems
- ☐ calculating Minimum spanning tree
- ☐ shortest and Minimum Spanning tree both can be calculated by it
- ☐ single source shortest path problems

correct

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Question No : 26 of 52

Marks: 1 (Budgeted Time 1 Min)

Kruskal's Algorithm has time complexity

Answer (Please select your correct option)

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- ☐ overall $O(E \log E)$ and for sparse graph $O(E \log V)$
- ☐ overall $O(EV)$ and for sparse graph $O(V^2)$
- ☐ overall $O(V \log E)$
- ☐ overall $O(E \log V)$ for sparse graph $O(V \log E)$

correct

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Question No : 27 of 52

Marks: 1 (Budgeted Time 1 Min)

Bellman Ford algorithm applies relaxation to every

Answer (Please select your correct option)

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- ☐ edge of the graph and repeats exactly $E-1$ times
- ☐ edge but use the back edges for the completion
- ☐ edge of the graph and repeats exactly $v-1$ times
- ☐ vertex of the graph and repeats exactly $E-1$ times

correct

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Question No : 28 of 52

Marks: 1 (Budgeted Time 1 Min)

Complexity wise the comparison based merge and quick sort algorithms fall in

Answer (Please select your correct option)

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- ☐ Deterministic Polynomial class
- ☐ Non-Deterministic Polynomial class
- ☐ Quick sort in P class and Merge sort in NP class
- ☐ Quick sort in NP class and Merge sort in P class

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Question No : 29 of 52

Marks: 1 (Budgeted Time 1 Min)

In NP-problems "NP" represents

Answer (Please select your correct option)

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☐

Non-deterministic Polynomials

correct

☐

Null-polynomials

☐

Negative Polynomials

☐

Non-polynomials

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Question No : 30 of 52

Marks: 1 (Budgeted Time 1 Min)

Floyd-Warshall algorithm dates back to the early _____.

Answer (Please select your correct option)

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☐

70's

☐

90's

☐

60's

correct

☐

50's

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Question No : 31 of 52

Marks: 1 (Budgeted Time 1 Min)

Space used by Floyd-Warshall algorithm is

the running time is $\Theta(n^3)$. The space used by the algorithm is $\Theta(n^2)$.

Answer (Please select your correct option)

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☐

$\Theta(n^4)$

☐

$\Theta(n^3)$

☐

$\Theta(n^2)$

correct

☐

$\Theta(2^n)$

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Question No : 32 of 52

Marks: 1 (Budgeted Time 1 Min)

In the clique cover problem, for two vertices to be in the same group, they must be _____ each other.

176

Answer (Please select your correct option)

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☐ Apart from☐ Far from☐ Near to☐ Adjacent to

correct

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Question No : 33 of 52

Marks: 1 (Budgeted Time 1 Min)

Polynomial time certificates

na!pta

Answer (Please select your correct option)

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☐ indicate there are polynomial solutions for NP -class problems☐ are the tools to solve the problems in P class in P time☐ use in reductions to verify for the NP-problems classes☐ use in Polynomial classes to interchange the problems

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Question No : 34 of 52

Marks: 1 (Budgeted Time 1 Min)

What is the solution to the recurrence $T(n) = T(n/2) + n$?

Answer (Please select your correct option)

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☐ $O(\log n)$ ☐ $O(n)$

correct

☐ $O(n \log n)$ ☐ $O(n^2)$

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Question No : 35 of 52

Marks: 1 (Budgeted Time 1 Min)

If a pseudo code is memory wise efficient then

Answer (Please select your correct option)

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☐

Obviously it will be time wise efficient as well.

☐

Memory wise efficient codes cannot be time wise efficient

☐

Time wise efficient code can be memory wise efficient but vise versa is not true.

☐

It may be memory wise efficient but not necessary

correct

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Question No : 36 of 52

Marks: 1 (Budgeted Time 1 Min)

Merge sort makes two recursive calls. Which statement is true after these recursive calls finish, but before the merge step?

Answer (Please select your correct option)

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☐

The array elements form a heap

☐

Elements in each half of the array are sorted amongst themselves

correct

☐

Elements in the first half of the array are less than or equal to elements in the second half of the array

☐

None of the given options

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Question No : 37 of 52

Marks: 1 (Budgeted Time 1 Min)

Search techniques of various algorithms look at ____

Answer (Please select your correct option)

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☐

Many possible solutions

correct

☐

Maximum 2 possible solutions

☐

Minimum 2 possible solutions

☐

Sorting solutions

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Question No : 38 of 52

Marks: 1 (Budgeted Time 1 Min)

Using ASCII standard each character is represented by a fixed length codeword of _____

Answer (Please select your correct option)

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☐ 9 bits

☐ 16 bits

☒ 8 bits

correct

☐ 32 bits

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Question No : 39 of 52

Marks: 1 (Budgeted Time 1 Min)

The Huffman encoding algorithm is a _____

Answer (Please select your correct option)

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☐ Dynamic and greedy algorithm

☐ Divide and conquer and greedy algorithm

☒ Greedy algorithm

correct

☐ Dynamic programming algorithm

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Question No : 40 of 52

Marks: 1 (Budgeted Time 1 Min)

Breadth first search is shortest path algorithm that works

Answer (Please select your correct option)

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☒ on un-weighted graphs

correct

☐ on weighted graphs

☐ on both weighted and un-weighted graphs

☐ BFS cannot be used for shortest path problems

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What is heap and heap order?

Answer ([Please click here to Add Answer](#))

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Define free tree.

Answer ([Please click here to Add Answer](#))

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A free tree is a tree with no vertex designated as the root vertex. A free tree with n vertices has exactly $n - 1$ edges. There exists a unique path between any two vertices of a free tree. Adding any edge to a free tree creates a unique cycle. Breaking any edge on this cycle restores the free tree.

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The following adjacency matrix represents a graph that consists of four vertices labeled 0, 1, 2 and 3. The entries in the matrix indicate edge weights.

	0	1	2	3
0	0	1	0	3
1	2	0	4	0
2	0	1	0	1
3	2	0	0	0

Answer the following question:

Answer ([Please click here to Add Answer](#))

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	0	1	2	3
0	0	1	0	3
1	2	0	4	0
2	0	1	0	1
3	2	0	0	0

Answer the following question:

Can an adjacency matrix for a directed graph ever *not* be square in shape? Why or why not?

Answer ([Please click here to Add Answer](#))

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Where clique cover problem arises?

Answer ([Please click here to Add Answer](#))

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The clique cover problem arises in applications of clustering. We put an edge between two nodes if they are similar enough to be clustered in the same group. We want to know whether it is possible to cluster all the vertices into k groups.

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Consider a digraph $G = (V, E)$ and any DFS forest for G . Prove that G has a cycle if and only if the DFS forest has a back edge.

Answer ([Please click here to Add Answer](#))

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Question No : 46 of 52

Marks: 3 (Budgeted Time 6 Min)

Describe three asymptotic notations.

Answer ([Please click here to Add Answer](#))

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Question No : 47 of 52

Marks: 3 (Budgeted Time 6 Min)

Briefly discuss at least three variants of the shortest path problem.

Answer ([Please click here to Add Answer](#))

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Question No : 48 of 52

Marks: 3 (Budgeted Time 6 Min)

What do you mean by polynomial time algorithm? Explain what kind of problem can be solved by using polynomial time algorithm?

Answer ([Please click here to Add Answer](#))

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Question No : 49 of 52

Marks: 5 (Budgeted Time 10 Min)

Suppose you could reduce an NP-complete problem to a polynomial time problem in polynomial time. What would be the consequence?

Answer ([Please click here to Add Answer](#))

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Question No : 50 of 52

Marks: 5 (Budgeted Time 10 Min)

According to Dijkstra's Algorithm, write the pseudo code to relax a vertex.

Answer ([Please click here to Add Answer](#))

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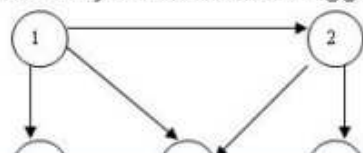


Made by: Waqar Siddhu

Question No : 51 of 52

Marks: 5 (Budgeted Time 10 Min)

Find the adjacent list for the following graph

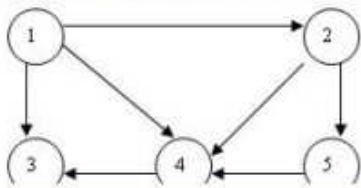


Answer ([Please click here to Add Answer](#))

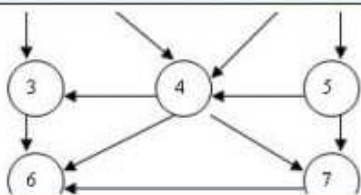
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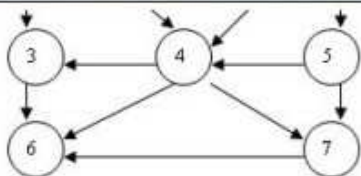
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Answer ([Please click here to Add Answer](#))

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**Made by: Waqar Siddhu**Answer ([Please click here to Add Answer](#))

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**Made by: Waqar Siddhu**

Draw the final **Max-Heap** structure for the following array,
 50, 31, 45, 30, 2, 7, 40, 12, 28, 1
 You can show the final result (tree) only.

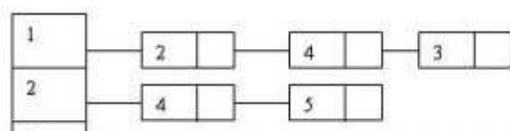
Answer (Please [click here to Add Answer](#))

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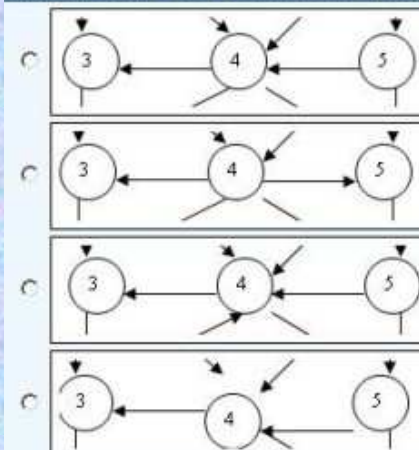
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Consider the following adjacency list:



Answer (Please select your correct option)

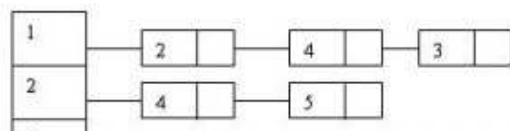
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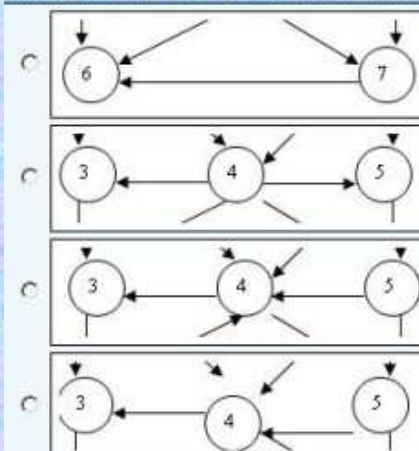
Start Time: 7:44 AM

Consider the following adjacency list:



Answer (Please select your correct option)

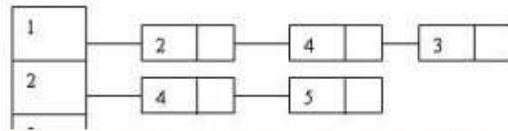
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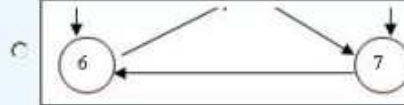
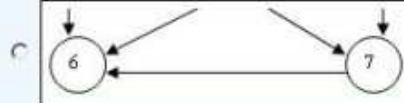
Start Time: 7:44 AM

Consider the following adjacency list:



Answer (Please select your correct option)

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Start Time: 7:44 AM