Unit-V Graph and Symbol Table Question Bank

Que. No.	Questions
1	In a max-heap, element with the greatest key is always in the which node? a) Leaf node b) First node of left sub tree c) root node d) First node of right sub tree Answer:-C)
2	What is the complexity of adding an element to the heap. a) O(log n) b) O(h) c) O(log n) & O(h) d) O(n) Answer:-C) Explanation: The total possible operation in re locating the new location to a new element will be equal to height of the heap.

3	The worst case complexity of deleting any arbitrary node value element from heap is _____ a) O(logn) b) O(n) c) O(nlogn) d) O(n^2) Answer:a) Explanation: The total possible operation in deleting the existing node and re locating new position to all its connected nodes will be equal to height of the heap.
4	Heap can be used as _____ a) Priority queue b) Stack c) A decreasing order array d) Normal Array **Answer: a)**

5	Heap contains elements (1,2,3,17,19,36,07, 25,100) sequentially starting from root. If we implement heap as min-heap, deleting root node (value 1)from the heap. What would be the value of root node after second iteration if leaf node (value 100) is chosen to replace the root at start. a) 2 b) 100 c) 17 d) 3 **Answer: a)**
6	Heap contains elements (100,19,36, 17,3,25,01,2,7) sequentially starting from root. If we implement heap as maximum heap , adding a new node of value 15 to the heap. What value will be at leaf nodes of the right subtree of the heap. a) 15 and 1 b) 25 and 1 c) 3 and 1 d) 2 and 3 Answer: b)
7	An array consists of n elements. We want to create a heap using the elements. The time complexity of building a heap will be in order of a) O(n*n*logn) b) O(n*logn) c) O(n*n) d) O(n *logn *logn) Answer: b)

8	A _____ is a special Tree-based data structure in which the tree is a complete binary tree.? A. Graph B. Heap C. List D. Stack Answer: b)
9	Given an array of element 5, 7, 9, 1, 3, 10, 8, 4. Which of the following is the correct sequences of elements after inserting all the elements in a min-heap? A. 1,3,4,5,7,8,9,10 B. 1,4,3,9,8,5,7,10 C. 1,3,4,5,8,7,9,10 D. 1,3,7,4,8,5,9,10 Answer: A)
10	Which one of the following array elements represents a binary min heap? A. 12 10 8 25 14 17 B. 8 10 12 25 14 17 C. 25 17 14 12 10 8 D. 14 17 25 10 12 8

	Answer B)
11	The max heap constructed from the array of numbers A[]={30, 10, 80, 60, 15, 55} is a) 80 55 60 15 10 30 b) 80 60 55 30 10 15 c) 60 80 55 30 10 15 d) none of the mentioned Answer: a)
12	What is the number of edges present in a complete graph having n vertices? a) (n*(n+1))/2 b) (n*(n-1))/2 c) n d) Information given is insufficient Answer: c)

13	In a simple graph, the number of edges is equal to twice the sum of the degrees of the vertices. a) True b) False Answer: b Explanation: The sum of the degrees of the vertices is equal to twice the number of edges.
14	A connected planar graph having 6 vertices, 7 edges contains _____ regions. a) 15 b) 3 c) 1 d) 11 Answer: b Explanation: By euler's formula the relation between vertices(n), edges(q) and regions(r) is given by n-q+r=2.
15	Which of the following ways can be used to represent a graph? a) Adjacency List and Adjacency Matrix b) Incidence Matrix c) Adjacency List, Adjacency Matrix as well as Incidence Matrix d) No way to represent Answer: c

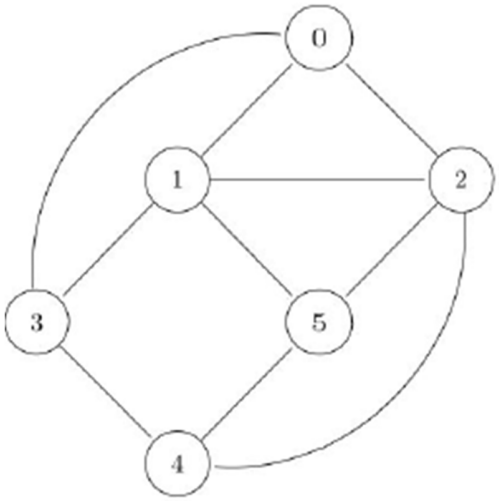
16	Breadth First Search is equivalent to which of the traversal in the Binary Trees? a) Pre-order Traversal b) Post-order Traversal c) Level-order Traversal d) In-order Traversal Answer: c
17	Time Complexity of Breadth First Search is? (V – number of vertices, E – number of edges) a) O(V + E) b) O(V) c) O(E) d) O(V*E) Answer: a
18	The Data structure used in standard implementation of Breadth First Search is? a) Stack b) Queue c) Linked List d) Tree Answer: b

19	The Breadth First Search traversal of a graph will result into? a) Linked List b) Tree c) Graph with back edges d) Arrays Answer: b
20	A person wants to visit some places. He starts from a vertex and then wants to visit every place connected to this vertex and so on. What algorithm he should use? a) Depth First Search b) Breadth First Search c) Trim's algorithm d) Kruskal's algorithm Answer: b
21	Which of the following is not an application of Breadth First Search? a) Finding shortest path between two nodes b) Finding bipartiteness of a graph c) GPS navigation system d) Path Finding Answer: d

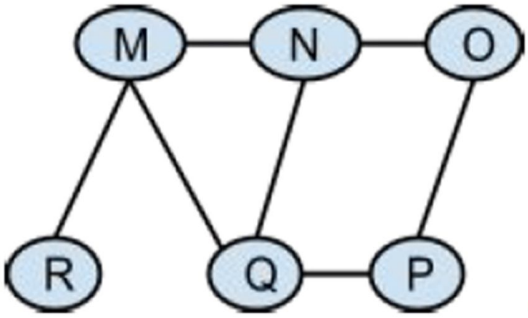
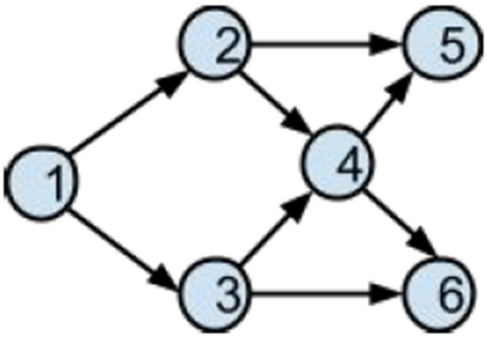
22	In BFS, how many times a node is visited? a) Once b) Twice c) Equivalent to number of indegree of the node d) Thrice Answer: c
23	Depth First Search is equivalent to which of the traversal in the Binary Trees? a) Pre-order Traversal b) Post-order Traversal c) Level-order Traversal d) In-order Traversal Answer: a
24	Time Complexity of DFS is? (V – number of vertices, E – number of edges) a) O(V + E) b) O(V) c) O(E) d) O(V*E) Answer: a

25	The Data structure used in standard implementation of Breadth First Search is? a) Stack b) Queue c) Linked List d) Tree Answer: a
26	The Depth First Search traversal of a graph will result into? a) Linked List b) Tree c) Graph with back edges d) Array Answer: b
27	A person wants to visit some places. He starts from a vertex and then wants to visit every vertex till it finishes from one vertex, backtracks and then explore other vertex from same vertex. What algorithm he should use? a) Depth First Search b) Breadth First Search c) Trim's algorithm d) Kruskal's Algorithm Answer: a

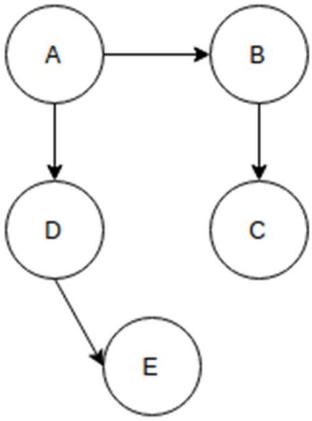
28	Which of the following is not an application of Depth First Search? a) For generating topological sort of a graph b) For generating Strongly Connected Components of a directed graph c) Detecting cycles in the graph d) Peer to Peer Networks Answer: d
29	In Depth First Search, how many times a node is visited? a) Once b) Twice c) Equivalent to number of indegree of the node d) Thrice Answer: c
30	Traversal of a graph is different from tree because a) There can be a loop in graph so we must maintain a visited flag for every vertex b)DFS of a graph uses stack, but inorrder traversal of a tree is recursive c)BFS of a graph uses queue, but a time efficient BFS of a tree is recursive. d)All of the above Answer: a

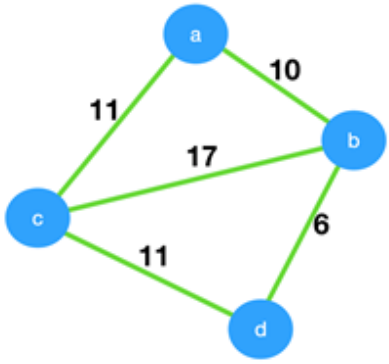
31	Which sequence corresponds to that of depth first search for the graph given below. The search starts at vertex 0 and lexicographic ordering is assumed for the edges emanating from each vertex.  A. 0 1 2 4 3 5 B. 0 1 2 5 4 3 C. 0 1 2 3 4 5 D. 0 1 3 4 2 5 Answer: A
32	Correct choice of data structures can improve the performance of algorithms. Match the following algorithms with appropriate data structures: i. Breadth first search a. Heap ii. Depth first search b. Stack iii. Sorting c. Queue A. ia iib iiic B. ib iia iiic

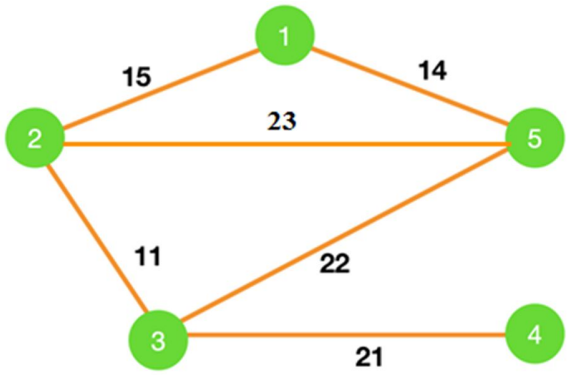
	C. ic iib iiia D. ib iic iia Answer: C
33	Given a rooted tree, one desires to find the shortest path from the root to a given node Which algorithm would one use to find this shortest path ? A. DFS B. BFS C. Either BFS or DFS Answer: C
34	Traversal of a graph is different than tree because. A. There can be a loop in the graph B. DFS on a graph uses stack, while inorder traversal is recursive C. Both A and C D. None of the above Answer: A
35	Consider the following graph. If we run breadth first search on this graph starting at any vertex, which one of the

	following is a possible order for visiting the no  des ? A. MNOPQR B. NQMPOR C. QMNPRO D. QMNPOR Answer: C
36	Which of the following is not a topological ordering of the following graph ?  A. 123456 B. 132456 C. 132645 D. 324165 Answer: D

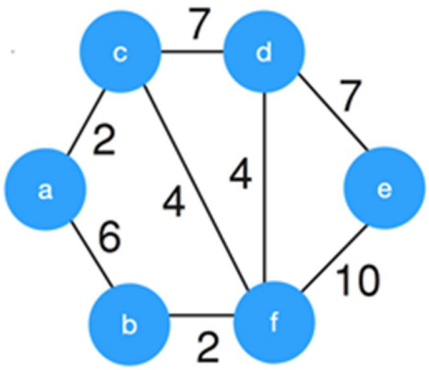
37	For an undirected graph G with n vertices and e edges, the sum of the degrees of each vertex is a. ne b. 2n c. 2e d. e^n Answer: c
38	A complete graph can have ..... a. n^2 spanning trees b. n^(n-2) spanning trees c. n^(n+1) spanning trees d. n^n spanning trees Answer: b
39	34. The number of edges in a simple, n-vertex, complete graph is a. n*(n-2) b. n*(n-1) c. n*(n-1)/2 d. n*(n-1)*(n-2) Answer: c
40	The spanning tree of connected graph with 10 vertices contains ..... a. 9 edges b. 11 edges c. 10 edges d. 9 vertices Answer: a)

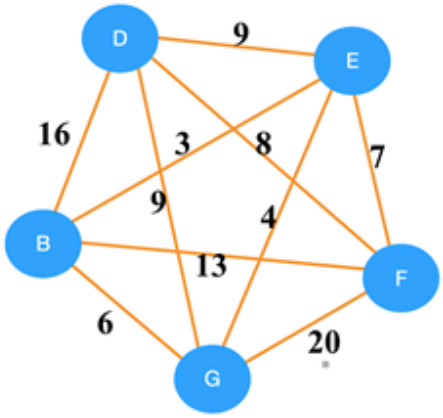
41	What would be the DFS traversal of the given Graph?  a. ABCDE b. AEDCB c. EDCBA d. ADECB Answer: a
42	Which of the following is true? a) Prim's algorithm initialises with a vertex b) Prim's algorithm initialises with a edge c) Prim's algorithm initialises with a vertex which has smallest edge d) Prim's algorithm initialises with a forest Answer: a)

43	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 Anwer: c)
44	Worst case is the worst case time complexity of Prim's algorithm if adjacency matrix is used? a) O(log V) b) O(V2) c) O(E2) d) O(V log E) Answer: b)

45	Prim's algorithm is a _____ a) Divide and conquer algorithm b) Greedy algorithm c) Dynamic Programming d) Approximation algorithm Answer: b)
46	Consider the graph shown below.  Which of the following edges form the MST of the given graph using Prim's algorithm, starting from vertex 4. a) (4-3)(5-3)(2-3)(1-2) b) (4-3)(3-5)(5-1)(1-2) c) (4-3)(3-5)(5-2)(1-5) d) (4-3)(3-2)(2-1)(1-5) Answer: d

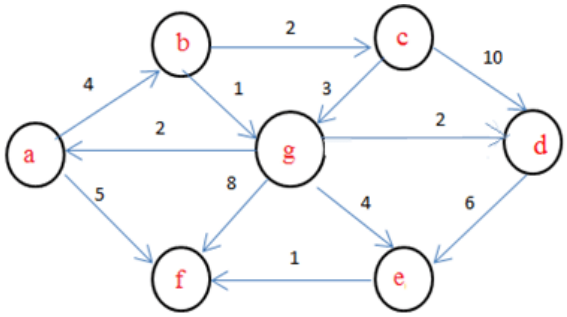
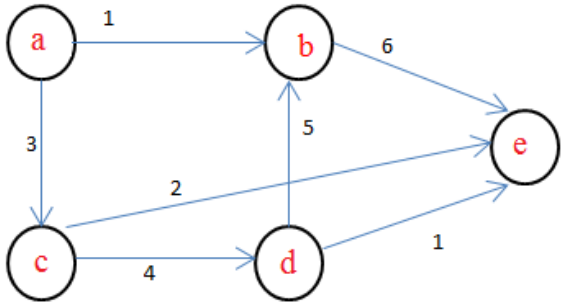
47	Which of the following is false about Prim's algorithm? a) It is a greedy algorithm b) It constructs MST by selecting edges in increasing order of their weights c) It never accepts cycles in the MST d) It can be implemented using the Fibonacci heap Answer: b)
48	Kruskal's algorithm is used to _____ a) find minimum spanning tree b) find single source shortest path c) find all pair shortest path algorithm d) traverse the graph Answer: a)
49	Kruskal's algorithm is a _____ a) divide and conquer algorithm b) dynamic programming algorithm c) greedy algorithm d) approximation algorithm Answer: c)

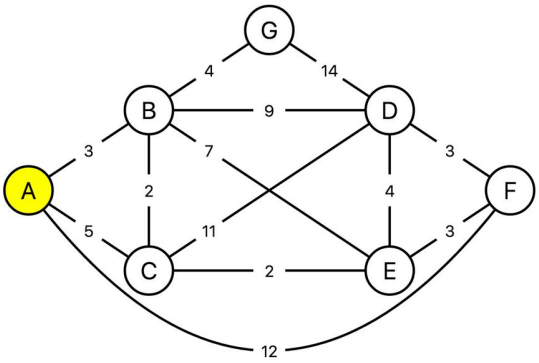
50	 Consider the given graph. What is the weight of the minimum spanning tree using the Kruskal's algorithm? a) 24 b) 23 c) 15 d) 19 Answer: d)
51	What is the time complexity of Kruskal's algorithm? a) O(log V) b) O(E log V) c) O(E2) d) O(V log E) Answer: b)

52	Which of the following edges form minimum spanning tree on the graph using kruskals algorithm?  a) (B-E)(G-E)(E-F)(D-F) b) (B-E)(G-E)(E-F)(B-G)(D-F) c) (B-E)(G-E)(E-F)(D-E) d) (B-E)(G-E)(E-F)(D-F)(D-G) Answer: a)
53	Which of the following is true? a) Prim's algorithm can also be used for disconnected graphs b) Kruskal's algorithm can also run on the disconnected graphs c) Prim's algorithm is simpler than Kruskal's algorithm d) In Kruskal's sort edges are added to MST in decreasing order of their weights Answer: b)
54	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

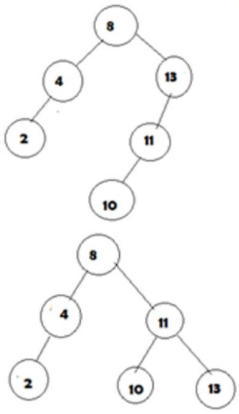
	b) Both S1 and S2 are false c) Both S1 and S2 are true d) S2 is true but S1 is false Answer: d)
55	Rather than build a subgraph one edge at a time …… builds a tree one vertex at a time. A) kruskal's algorithm B) prim's algorithm C) dijkstra algorithm D) bellman ford algorithm Answer: B)
56	Dijkstra's Algorithm is used to solve _____ problems. a) All pair shortest path b) Single source shortest path c) Network flow d) Sorting Answer: b)

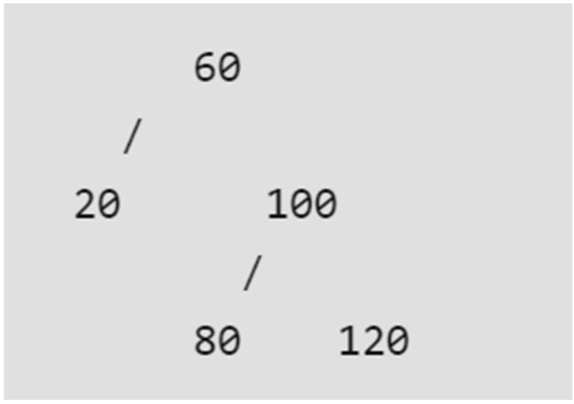
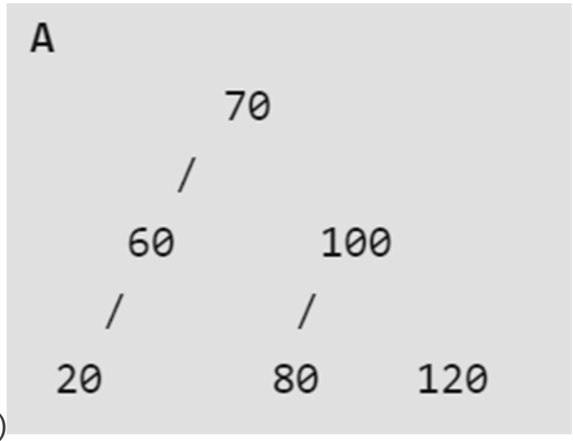
57	Which of the following is the most commonly used data structure for implementing Dijkstra's Algorithm? a) Max priority queue b) Stack c) Circular queue d) Min priority queue Answer: d)
58	What is the time complexity of Dijikstra's algorithm? a) O(N) b) $O(N_3)$ c) $O(N_2)$ d) O(logN) Answer: c)
59	Dijkstra's Algorithm cannot be applied on _____ a) Directed and weighted graphs b) Graphs having negative weight function c) Unweighted graphs d) Undirected and unweighted graphs Answer: b)

60	Consider the following graph.  If b is the source vertex, what is the minimum cost to reach f vertex? a) 8 b) 9 c) 4 d) 6 Answer: d)
61	In the given graph, identify the shortest path having minimum cost to reach vertex E if A is the source vertex.  a) a-b-e b) a-c-e c) a-c-d-e d) a-c-d-b-e Answer: b)

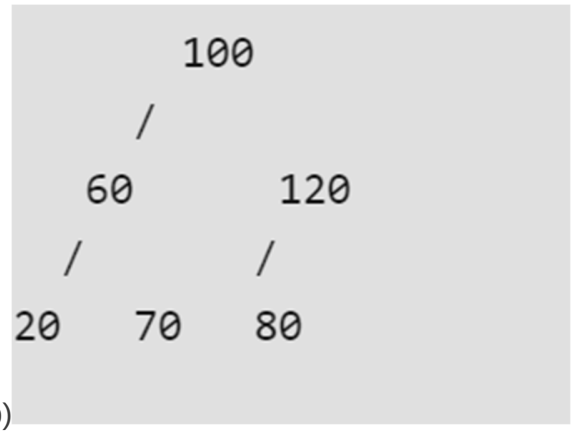
62	What is the shortest path from node A to node F?  A. A -> B -> D -> F B. A -> C -> B -> E -> F C. A -> F D. A -> C -> E -> F Answer: D.
63	By whom is the symbol table created? **1.** Compiler **2.** Interpreter **3.** Assembler **4.** None of the mentioned Answer: 1
64	Select a Machine Independent phase of the compiler 1. Syntax Analysis 2. Intermediate Code generation 3. Lexical Analysis 4. All of the mentioned

	Answer: 4
65	What is an AVL tree? a) a tree which is balanced and is a height balanced tree b) a tree which is unbalanced and is a height balanced tree c) a tree with three children d) a tree with atmost 3 children Answer: a
66	Why we need to a binary tree which is height balanced? a) to avoid formation of skew trees b) to save memory c) to attain faster memory access d) to simplify storing Answer: a

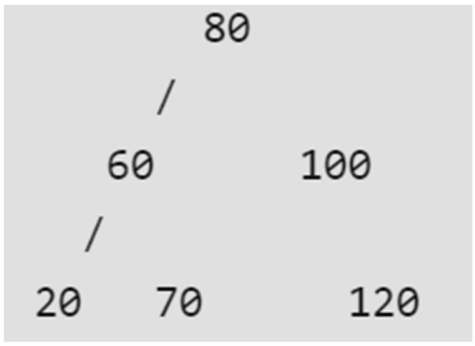
67	Which of the below diagram is following AVL tree property?  a) only i b) only i and ii c) only ii d) i is not a binary search tree Answer: b
68	What is the maximum height of an AVL tree with p nodes? a) p b) log(p) c) log(p)/2 d) p/2 Answer: b

69	What is the maximum height of any AVL-tree with 7 nodes? Assume that the height of a tree with a single node is 0. **(A)** 2 **(B)** 3 **(C)** 4 **(D)** 5 Answer b
70	Which of the following is updated AVL tree after insertion of 70  a) 

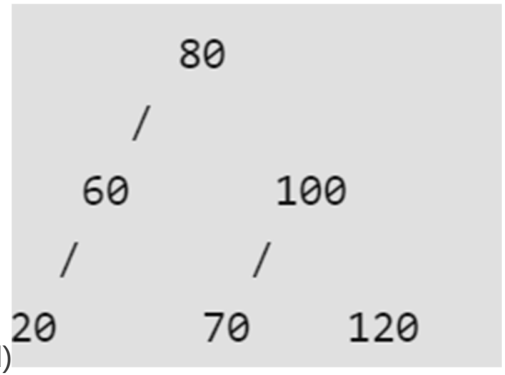
b)



c)



d)



(A) A

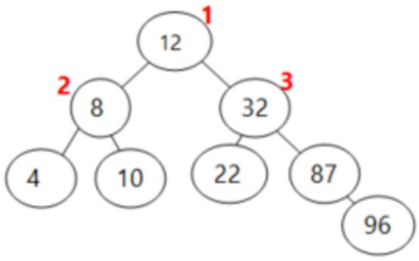
(B) B

	(C) C **(D)** D Answer :C
71	Which of the following is TRUE? A)The cost of searching an AVL tree is θ (log n) but that of a binary search tree is O(n) B)The cost of searching an AVL tree is θ (log n) but that of a complete binary tree is θ (n log n) C)The cost of searching a binary search tree is O (log n) but that of an AVL tree is θ(n) D)The cost of searching an AVL tree is θ (n log n) but that of a binary search tree is O(n) Answer a)
72	The balance factor of a node in a binary tree is defined as ..... A addition of heights of left and right subtrees B height of right subtree minus height of left subtree C height of right subtree minus height of left subtree D height of right subtree minus one Answer c)

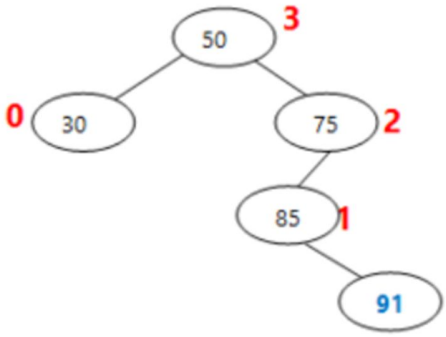
73

Which of the following illustrations have all their correct balance factors correctly displayed (in red)?

a.



b.



a)1 is correct

b)both 1 &2 are correct

c)2 is correct

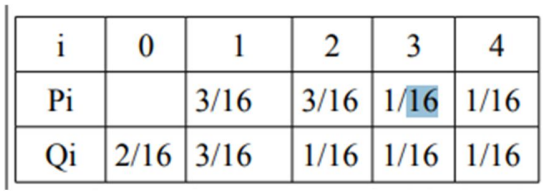
d)None of the Above

Answer d

74	**What are the conditions for an optimal binary search tree and what is its advantage?** **a) The tree should not be modified and you should know how often the keys are accessed, it improves the lookup cost** **b) You should know the frequency of access of the keys, improves the lookup time** **c) The tree can be modified and you should know the number of elements in the tree before hand, it improves the deletion time** **d) The tree should be just modified and improves the lookup time** **Answer a**
75	**What output does the below pseudo code produces? Tree....node function(Tree....node x) { Tree....node y = x.left; x.left = y.right; y.right = x; return y; }** **Aright rotation of subtree** **B left rotation of subtree** **C zig-zag operation** **D zig-zig operation** **Answer a**

76	**LR rotation requires** **A. first left rotation and then right rotation** **B. First right rotation and then left rotation** **C. one left rotation** **D. one right rotation** **Answer: A**
79	**Insert following numbers in an empty AVL tree in the sequence 1,2,3,4,8,7,6 Perform inorder traversal** **A. 1234678** **B. 2143768** **C. 3124768** **D. None of these** **Answer: A**
80	**If the balance factor of any node is +1 then** **A. The height of the left subtree is one more than the right subtree** **B. The height of the left subtree is one less than the right subtree**

	C. The height of the left and right subtrees are equal **D. None of the abve** **Answer: A**
81	**The OBST is an example of** **A Static symbol table** **B Dynamic symbol table** **C All of above** **D None of above** **Answer: A**
82	**What is the time complexity of OBST?** **A O(n3)** **B O(nlogn)** **C O(logn)** **D O(n2)** **Answer A**

83	**The worst case height of an AVL tree with n nodes is** **A 1.44log(n+2)** **B 2.44log(n+2)** **C 3.44log(n+2)** **D 4.44log(n+2)** **Answer A**
84	**The OBST makes use of _____ for computing cost.** **A Height of tree** **B Balance factor** **C Leaf nodes** **D Probability of searches Answer D**
85	**Given the following table of data what are the minimum expected no. of comparisons required for an Optimal BST that can be constructed with the given data**  **A 2**

i	0	1	2	3	4
Pi		3/16	3/16	1/16	1/16
Qi	2/16	3/16	1/16	1/16	1/16

	B 3 **C 4** **D 1** **Answer-1**
86)	**What is the cost of the OBST with zero nodes** **A)0** **B)qi** **c)-1** **d)None of the above** **Answer a**
87	**How to we calculate cost of OBST with n nodes considering k is the root node** **1)$C_{i,j}=i<k\leq j\{C_{i,k-1}+C_{k,j}\}+W_{i,j}$** **2)$C_{i,j}=i<k\leq j\{C_{i,k-1}+C_{k,j}\}$**

	3)$C_{i,j}=i\leq k\leq j\{C_{i,k-1}+C_{k,j}\}$ **4)$C_{i,j}=i\leq k\leq j\{C_{i,k-1}+C_{k,j}\}$ + Wi,** **Answer 1)**
88	**How do we calculate weight of the tree with one node** 1)$W_{i,i+1}=q_i+q_{(i+1)}+p_{(i+1)}$ 2)$W_{i,i+1}=q_i+q_{(i+1)}-p_{(i+1)}$ 3)$W_{i,i+1}=q_i-q_{(i+1)}-p_{(i+1)}$ 4)None of the above Answer: a
89	**What will be the Weight of OBST with 4 nodes.Given p(1:4)=(3,3,1,1) and q(0:4)=(2,3,1,1,1) & W03=14** **a)16** **b)18** **c)24** **d) insufficient data** **Answer a**

90)	**What will be the root of the OBST where c12 =`7 .root will be** **a)1** **b)2** **c)1 or 2** **d) none of the above** **Answer 2**

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