Modern Education Society's College of Engineering, Pune - 411 001
Department of Computer Engineering

Question Bank

Subject: Data Structures and algorithms
Class: SE

Unit 1

Q.NO	Questions	CO Mapped	Marks	Memory Based	Conceptual	Analytical	Application
Q.1	Explain about skip list with an example. Give applications of skip list.	CO1	4	✔			✔
Q.2	For the given set of values. 11,33,20,88,79,98,44,68,66,22 Create a hash table with size 10 and resolve collision using chaining with replacement and without replacement. Use the modulus Hash function. (key% size).	CO1	6		✔		
Q.3	What is hash function? Enlist characteristic of a good hash function. Explain modulo Division and folding method.	CO1	5	✔		✔	
Q.4	What is collision? What are different collision resolution techniques?	CO1	4		✔	✔	
Q.5	Explain the terms bucket, collision, probe, perfect hash function. Illustrate what is the use of hash tables.	CO1	6	✔			✔
Q.6	Construct a hash table of size 10 using linear probing with replacement strategy for collision resolution. The hash function is h(x)=x%10. Calculate total numbers of comparisons required for searching. Consider slot per bucket is 1 25,3,21,13,1,2,7,12,4,8.	CO1	6		✔	✔	

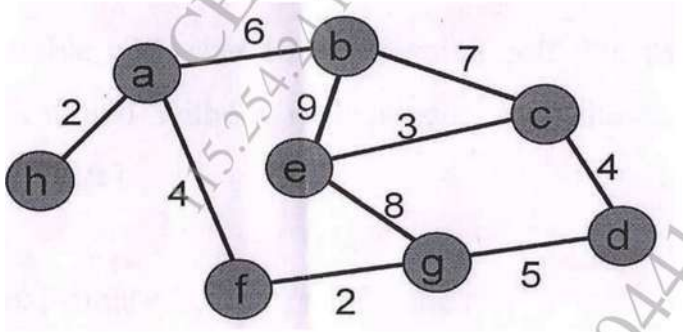| Q.NO	Questions	CO Mapped	Marks	Memory Based	Conceptual	Analytical	Application
Q.7	Write a short note on skip list.	CO1	4	✔			
Q.8	What do you mean by re-hashing? When is it used?	CO1	4		✔		✔
Q.9	What do you mean by hashing ? Explain in brief different hashing methods?	CO1	6	✔			
Q.10	Write the properties of hashing function?	CO1	4	✔			
Q.11	Assume the size of hash table as 10. The hash function to be used to calculate the hash value of the data X is X%10. Insert the following values in hash table:100,102,200,108,105.Use linear probing without replacement for handling collision.	CO1	5		✔		

Unit 2

Q.NO	Questions	CO Mapped	Marks	Memory Based	Conceptual	Analytical	Application
Q.1	Write the algorithm for non-recursive preorder traversal. Support your answer using a suitable example (must include pseudo code).	CO1	4	✔			✔
Q.2	Construct a binary tree from given two traversals: inorder traversal-1,2,3,14,7,10,11,40,30 postorder traversal-1,3,2,7,10,40,30,11,14	CO1	6		✔		
Q.3	Write a pseudo code for performing level-order traversal of a binary tree.	CO1	5		✔		
Q.4	What is the difference between single threaded and multi-threaded binary tree? Explain with the help of examples	CO1	6			✔	
Q.5	State the 5 applications of Tree ?	CO1	5				✔
Q.6	Write an algorithm for preorder arrangement with suitable example?	CO1	4		✔		
Q.7	Write a short note on BST. And explain with suitable example?	CO1	4		✔		✔
Q.8	Write a C/C++ function to print given tree in DFS (without using recursion)	CO1	4		✔		

Q.9	What is the difference between graph and tree?	CO1	6			✔	
Q.10	Let characters a,b,c,d,e,f have probabilities 0.07,0.09,0.12,0.22,0.23,0.27 respectively. Find an optimal Huffman code and draw Huffman tree.	CO1	6	✔	✔	✔	✔
Q.11	Write a C/C++ function to print given tree in DFS (without using recursion)	CO1	5	✔	✔		

Unit 3

Q.NO	Questions	CO Mapped	Marks	Memory Based	Conceptual	Analytical	Application
Q.1	Consider given graph and find shortest path by using Dijkstra's Algorithm from A to G.	CO1	6		✔		✔
Q.2	Draw any directed graph with minimum 6 nodes and represent graph using adjacency matrix, adjacency list, adjacency multi-list and inverse multi-list.	CO1	6			✔	

| Q.3 | Define DFS and BFS for a graph. Show BFS and DFS for following graph with starting vertex as 1. | CO1 | 5 | ✔ | ✔ | | |

| Q.4 | Differentiate between Prim's and Kruskal's Algorithm for generating spanning of graph. Support your answer using time complexity. | CO1 | 4 | | | ✔ | ✔ |

| Q.5 | Find MST for the graph given using Kruskal's algorithm and show all steps | CO1 | 6 | | ✔ | | |

| Q.6 | Write short note on topological sorting. | CO1 | 3 | ✔ | | | ✔ |

| Q.7 | Consider the graph represented by the following adjacency matrix. | CO1 | 6 | | ✔ | ✔ | ✔ |

Vertex	1	2	3	4	5	6
1	0	3	1	6	0	0
2	3	0	5	0	3	0
3	1	5	0	5	6	4
4	6	0	5	0	0	2
5	0	3	6	0	0	6
6	0	0	2	2	6	0

And find minimum spanning tree of this graph using Prim's Algorithm.

| Q.8 | Explain any 3 applications of graph in the area of computer engineering. | CO1 | 6 | | | ✔ | ✔ |

Q.9	What are the application of graph theory in computer?	CO1	4	✔				✔
Q.10	Write a short note on the adjency matrix and adjency list with time complexity?	CO1	6		✔	✔		
Q.11	Explain Dijkstra's algorithm with an example.	CO1	5		✔			

Unit 4

Q.NO	Questions	CO Mapped	Marks	Memory Based	Conceptual	Analytical	Application
Q.1	Explain with examples LL,LR,RR and RL rotations for AVL tree.	CO2	5	✔	✔	✔	
Q.2	Construct the AVL tree for the following data by inserting each of the following data item one at a time: 10,20,15,12,25,30,14,22,35,40.	CO2	6		✔		
Q.3	Explain with examples Height Balanced Tree.	CO2	6		✔	✔	
Q.4	Construct the AVL tree for the following data by inserting each of the following data item one at a time: A,Z,B,Y,C,X,D,U,E.	CO2	7		✔		
Q.5	Construct the AVL tree for the following data by inserting each of the following data item one at a time: JAN,APRIL,MARCH,JULY,AUG,OCT,NOV,MAY,JUNE	CO2	6		✔		
Q.6	Write a short note on Dynamic Programming with principle of Optimality.	CO2	7		✔		✔
Q.7	Explain with examples Weight Balanced Tree.	CO2	6	✔	✔	✔	
Q.8	Write a short note on applications of different search trees.	CO2	5	✔			✔
Q.9	What is Optimal Binary Search Tree (OBST)	CO2	5	✔			✔
Q.10	Find the Optimal Binary Search Tree for the : Identifier set {a1, a2, a3} = {do, if, while} Where n = 3 and Probabilities of successful search as {p1, p2, p3} = {0.5, 0.1,0.05} and Probability of unsuccessful search as {q0, q1, q2,q3} = {0.15, 0.1, 0.05, 0.05}	CO2	6	✔			✔
Q11.	Short notes on: Red-Black Tree, AA tree, K-dimensional tree, Splay Tree	CO2	6	✔			✔

Unit 5

Q.NO	Questions	CO Mapped	Marks	Memory Based	Conceptual	Analytical	Application
Q.1	Explain indexing techniques-primary, secondary, dense, sparse	CO2	8	✔	✔	✔	
Q.2	What is B+ tree ?Give structure of its internal node.What are the order of B+ tree and characteristics of B+ tree.	CO2	8	✔	✔	✔	
Q.3	Explain the steps to build a B-tree of order 5 for the following data: 78,21,14,11,97,85,74,63,45,42,57,20,16,19,32,30,31	CO2	7		✔		
Q.4	Draw a B-tree of order 3 for the following sequence of keys: 2, 4, 9, 8, 7, 6, 3, 1, 5, 10	CO2	7		✔		
Q.5	Insert the following keys to a 5-ways B-tree : 3, 7, 9, 23, 45, 1, 5, 14, 25, 24, 13, 11, 8, 19, 4, 31, 35, 56	CO2	6		✔		
Q.6	Write algorithm to delete a node from B-Tree.	CO2	7		✔		✔
Q.7	Draw a B+ of order 3 for the following sequence of keys: 1,42,28,21,31,10,17,7,31,25,20,18	CO2	8		✔		
Q.8	Short note on Trie Tree	CO2	4		✔		

Unit 6

Q.NO	Questions	CO Mapped	Marks	Memory Based	Conceptual	Analytical	Application
Q.1	Compare index sequential and direct access file.	CO3	4	✔	✔	✔	
Q.2	What is file ? List different file opening modes in file by opening file in append mode.Search for a specific record entered by user.	CO3	7	✔	✔		

Q.3	State different file organizations and discuss their advantages and disadvantages.	CO3	6	✔	✔	✔	
Q.4	Define sequential file organization.Write a pseudo code for insertion of records in sequential file.	CO3	6	✔	✔		
Q.5	Write a short note on external sort.	CO3	5		✔		✔
Q.6	Explain any three operations on sequential file organization with example.	CO3	6	✔	✔		✔
Q.7	Explain any two types of indices.	CO3	6	✔	✔		
Q.8	Explain advantages of indexing over sequential file.	CO3	7	✔		✔	
Q.9	Explain linked file organization.	CO3	5	✔	✔		
Q.10	Explain Direct Access file.	CO3	5	✔	✔		

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