



- (b) Merging
- (c) Inserting
- (d) Traversal

1-d. In \_\_\_\_\_, the heights of the two child subtrees of any node differ by at most one. (CO2) 1

- (a) Binary Tree
- (b) Red Black Tree
- (c) Splay Tree
- (d) AVL Tree

1-e. What should we call a binary tree whose every node has either zero or two children? (CO3) 1

- (a) Complete Binary Tree
- (b) Binary Search Tree
- (c) Full Binary Tree
- (d) None of the mentioned

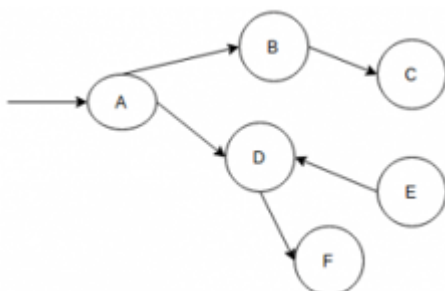
1-f. Which of the following is / are the Applications of B Tree's? (CO3) 1

- (a) File Systems
- (b) Databases
- (c) Both of the mentioned
- (d) None of the mentioned

1-g. Consider the graph shown below. Which of the following are the edges in the MST of the given graph? (CO4) 1

- (a) (a-c)(c-d)(d-b)(d-b)
- (b) (c-a)(a-d)(d-b)(d-e)
- (c) (a-d)(d-c)(d-b)(d-e)
- (d) (c-a)(a-d)(d-c)(d-b)(d-e)

1-h. What sequence would the BFS traversal of the given graph yield? (CO4) 1

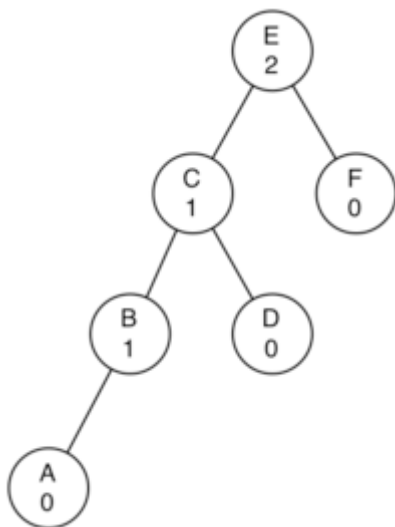


- (a) A F D B C E
- (b) C B A F E D
- (c) A B D C E F
- (d) E F D C B A

- 1-i. In simple chaining, what data structure is appropriate? (CO5) 1
- (a) Singly linked list
  - (b) Doubly linked list
  - (c) Circular linked list
  - (d) Binary trees
- 1-j. Which of the following variant of a hash table has the best cache performance? (CO5) 1
- (a) hash table using a linked list for separate chaining
  - (b) hash table using binary search tree for separate chaining
  - (c) hash table using open addressing
  - (d) hash table using a doubly linked list for separate chaining

**2. Attempt all parts:-**

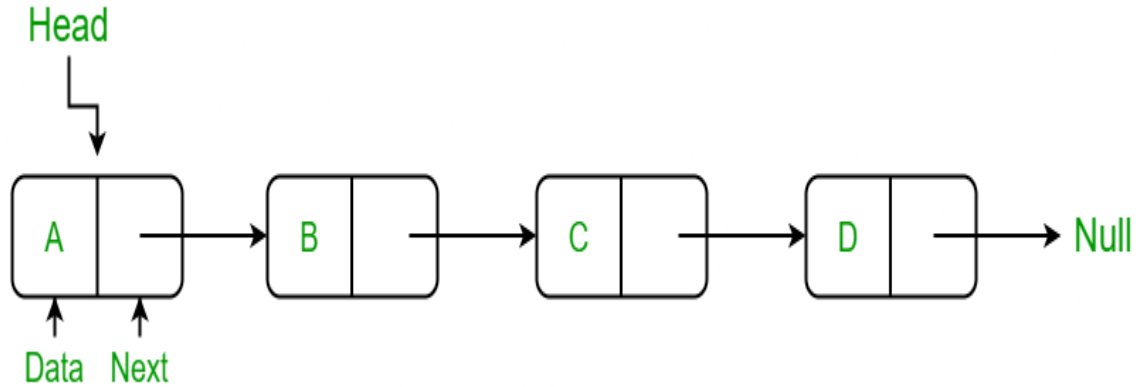
- 2.a. How can we compare between two algorithms written for the same problem? (CO1) 2
- 2.b. Convert the following infix expression into postfix expression:  $A * [B + C * (D + E)] / F * (G + H)$  (CO2) 2
- 2.c. Balance the following tree by applying AVL rotations. (CO3) 2



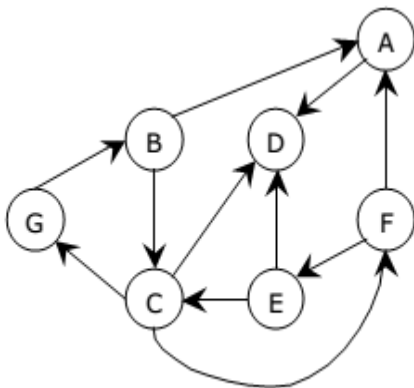
- 2.d. Explain threaded binary tree. (CO4) 2
- 2.e. How the graph can be represented in memory? Explain with suitable example. 2

3. Answer any five of the following:-

- 3-a. Which characteristics of algorithms shows that running time or the execution time of operations of data structure must be as small as possible.(CO1) 6
- 3-b. What is recursion? Indicate its properties? (CO1) 6
- 3-c. Write a C routine to Delete a node 'C' from the given link list. (CO2) 6



- 3-d. If the Tower of Hanoi is operated on n=10 disks, calculate the total number of moves.(CO2) 6
- 3.e. How binary trees are represented as link list in the memory. (CO3) 6
- 3.f. Find the set of all edges generated by DFS tree starting at node B of the following graph. (CO4) 6



Node	Adjacency List
A	D
B	A C
C	G D F
D	----
E	C D
F	E A
G	B

- 3.g. What do you understand by file organization? What is its use? What are the various operations that can be performed over a file? (CO5) 6

SECTION C

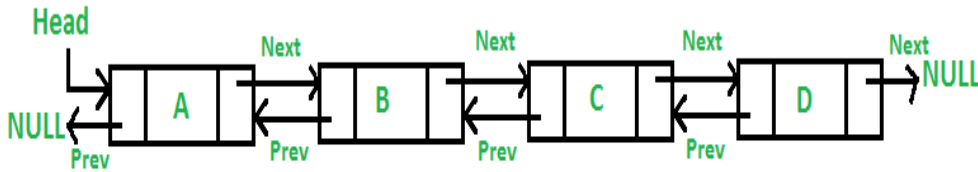
4. Answer any one of the following:-

- 4-a. What are the merits and demerits of array? Given two arrays of integers in ascending order, develop an algorithm to merge these arrays to form a third array sorted in ascending order. (CO1) 10

- 4-b. (i) Differentiate between iteration and recursion. 10  
(ii) Write the recursive solution for Tower of Hanoi problem. (CO1)

**5. Answer any one of the following:-**

- 5-a. Write a C routine to insert a node 'E' between node 'C' and 'D' in the given doubly link list. (CO2) 10



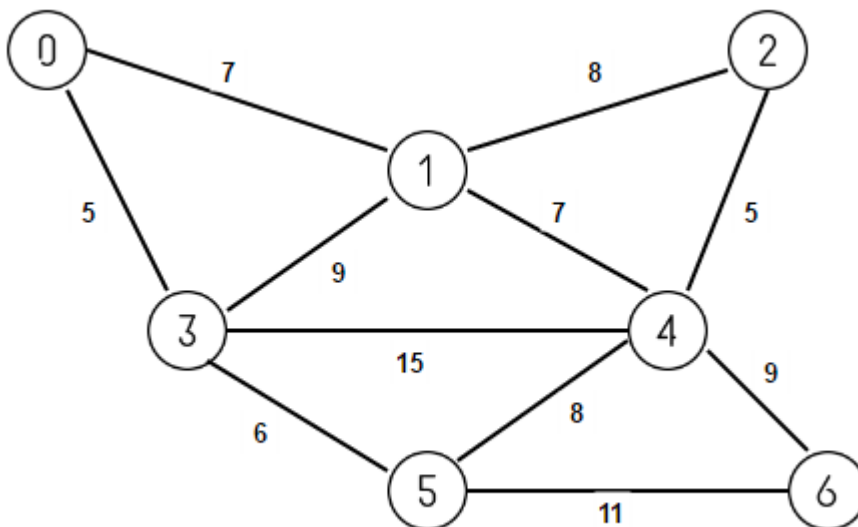
- 5-b. What are the basic operations we can do with a stack? Write the code for push, pop and empty operations, assuming the stack is implemented as (a) a linked list or (b) a fixed-size array. (CO2) 10

**6. Answer any one of the following:-**

- 6-a. What is Spanning Trees? Explain Spanning Tree in detail with example.(CO3) 10  
6-b. How will you balance the tree constructed using elements : 8,10,21,28,36,50. (CO3) 10

**7. Answer any one of the following:-**

- 7-a. Find Minimum spanning tree of the following graph using Krushkal's algorithm. (CO4) 10



- 7-b. Why is quick sort named as quick? Show the steps of quick sort on the following set of elements:25, 57, 48, 37, 12, 92, 86, 33. Assume the first element of the list to be the pivot element. (CO4) 10

**8. Answer any one of the following:-**

- 8-a. What is hash table? What are the properties of hash function? How is it helpful in organising a file? Justify your answer. (CO5) 10
- 8-b. Classify the Hashing Functions based on the various methods by which the key value is found. What are the types of Collision Resolution Techniques and the methods used in each of the type? (CO5) 10

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