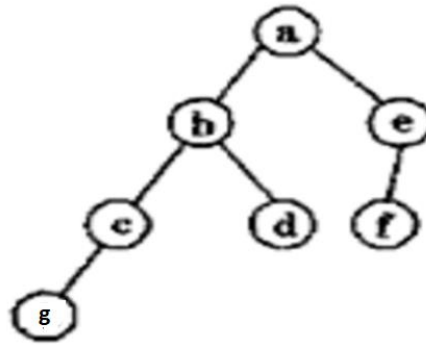


(viii) Consider the balanced binary tree below:



How many nodes will become un-balanced if a node is inserted as a child of the node g?

- (a) 1 (b) 3 (c) 7 (d) 8.

(ix) You have a sorted array and now you are given an element to be placed in that array so that the resulting array is also sorted, the best sorting technique in this case is

- (a) Quick Sort (b) Merge Sort
(c) Insertion Sort (d) Bubble Sort

(x) Using radix sort, to sort a list of alpha-numeric data _____ number of buckets will be required.

- (a) 10 (b) 36 (c) 62 (d) 52

Fill in the blanks with the correct word

(xi) The postfix expression of $A+C/B*D-E$ is _____.

(xii) A binary search tree is generated by inserting the following integers: 50, 15, 62, 5, 20, 58, 91, 3, 8, 37, 60, and 24. The number of nodes in the right-subtree of the root is _____.

(xiii) A binary tree with 27 nodes has _____ null branches.

(xiv) _____ traversal of BST represents a sorted list of elements.

(xv) If a set of sorted integers is inserted in a Binary Search Tree then to search a certain item it's time complexity will be _____.

Group - B

2. (a) With an example explain how the concept of ADT is implemented.

[[C01](Analyse/IOCQ)]

(b) Write an algorithm to add two matrices represented in sparse form. Describe all assumptions that you will need to perform this operation.

[[C02](Apply/IOCQ)]

4 + 8 = 12

3. (a) Compare between array and linked list.

[[C03](Analyse/HOCQ)]

(b) Write an algorithm to count the number of nodes in a singly linked list.

[[C02](Apply/IOCQ)]

(c) Write an algorithm to reverse a circular linked list.

[[C02](Apply/IOCQ)]

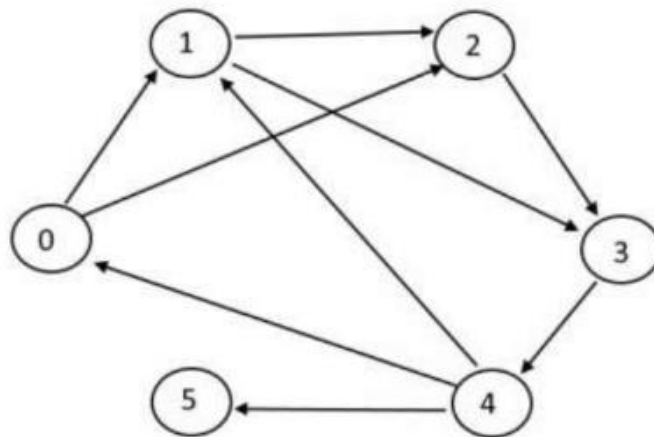
4 + 3 + 5 = 12

Group - C

4. (a) Write an algorithm to convert an infix expression into an equivalent postfix expression. [[CO2](Apply/IOCQ)]
 (b) What is input restricted de-queue? Explain with example. [[CO2](Remember/LOCQ)]
 (c) What is tail recursion? Give example. [[CO2](Remember/LOCQ)]
 $6 + (2 + 2) + 2 = 12$
5. (a) State the Towers of Hanoi problem. Devise a solution to the Towers of Hanoi problem clearly explaining the pre-condition and post-condition for any algorithm you write. [[CO2](Analyse/IOCQ)]
 (b) What is priority queue? [[CO2](Remember/LOCQ)]
 (c) Write a recursive function to find the n^{th} Fibonacci number. [[CO2](Analyse/IOCQ)]
 $(2 + 4) + 2 + 4 = 12$

Group - D

6. (a) What are two ways of representing binary trees in the memory? Which one do you prefer and why? [[CO2](Understand/LOCQ)]
 (b) Given a binary tree whose inorder and preorder traversals are given by
 Inorder: E I C F B G D J H K
 Preorder: B C E I F D G H J K
 Draw the tree. What will be the post order traversal of the binary tree? [[CO2](Apply/IOCQ)]
 (c) In a full binary tree of height k, how many internal nodes are present? [[CO2](Analyse/IOCQ)]
 $(2 + 2) + 5 + 3 = 12$
7. (a) Insert the following keys in order to build them into an AVL tree: A Z B Y C X D W E V F
 Clearly mention the different rotations used and the balance factor of each node. [[CO2](Apply/IOCQ)]
 (b) Find the breadth first search traversal and the depth first search traversal for the following graph, starting from node 0. Explain the steps.



[[CO4](Apply/IOCQ)]
 $6 + 6 = 12$

Group - E

8. (a) “Quick sort is not at all quick” – Do you agree? Justify your answer.
[[C05](Analyse/HOCQ)]
- (b) Sort the array given below using quick sort showing the value of the array elements in each pass:
39 9 81 45 90 27 72 18
[[C05](Apply/IOCQ)]
- (c) How the time complexity of average case of merge sort becomes $O(n \log n)$?
[[C03,C05](Analyse/IOCQ)]
 $4 + 5 + 3 = 12$
9. (a) What is the advantage of applying hashing? What are the characteristics of a good hash function?
[[C06](Remember/LOCQ)]
- (b) A hash function f defined as $f(\text{key}) = \text{key} \bmod 8$, with linear probing, is used to insert the keys 96, 38, 72, 48, 98, 11, 56 into a table indexed from 0 to 7. What will be the location of key 98? Show your work. What is quadratic probing?
[[C06](Analyse/IOCQ)]
 $(2 + 3) + (2 + 3 + 2) = 12$
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Cognition Level	LOCQ	IOCQ	HOCQ
Percentage distribution	17.70	73.95	8.33