Progressive Education Society's
Modern College of Arts, Science & Commerce(Autonomous)
Ganeshkhind, Pune – 16
End Semester Examination: April 2024
Faculty: Science and Technology

Program : B.Sc.Computer Science
Program (Specific) : Computer Science
Code : (BScComp05)
Class : S.Y.B.Sc. Computer Science
Name of the Course : Data Structures and Algorithms - II
Course Code : 23 - CS -241

Semester : IV
SET : B
Course Type : CC
Max.Marks: 35
Paper : I
Time : 2Hrs

Instructions to the candidate:

1) ***There are 4 sections in the question paper. Write each section on a separate page.***
2) ***All Sections are compulsory.***
3) ***Figures to the right indicate full marks.***
4) ***Draw a well labeled diagram wherever necessary.***

SECTION : A

Q1) Solve the following Multiple-Choice Question **[5]**

1. In an expression tree , the root is _____.
   a. Operator b. Operand
   c. Null d. Empty
2. _____ is a strictly balanced tree.
   a. Binary Tree b. Binary Search Tree
   c. AVL Tree d. Red Black Tree
3. _____ data structure is used in DFS traversal.
   a. Array b. Stack
   c. Queue d. Tree
4. If several elements are hashed in the same bucket in the hash table , it is called_____
   a. Confusion b. Replication
   c. Collision d. Duplication
5. In which of the following trees, the leaves are at the same level?
   a. AVL Tree b. Red Black Tree
   c. B Tree d. Binary Search Tree

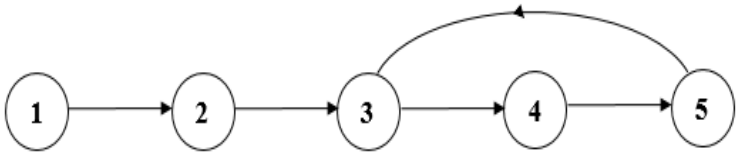
Q2) Attempt ANY FOUR of the following in one sentence: **[4]**

a. State the structure for the binary tree.
b. List the properties of a B Tree.
c. Define Bucket.
d. State the inventors of AVL Tree.
e. List applications of graphs.
f. Define spanning tree.

SECTION : B

Q3) Attempt ANY FOUR of the following: **[8]**

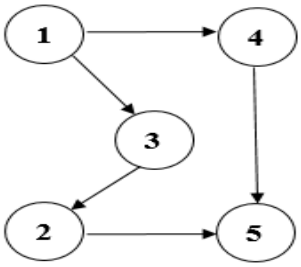
a. Write the recursive function for the postorder tree traversal method.
b. State the range of balance factor in AVL Tree.
c. Represent the given expression as binary tree : (A + B) * C
d. Explain two phases of the Red Black Tree.
e. Differentiate between DFS and BFS.
f. Represent the following graph in their adjacency matrix and adjacency list.



SECTION : C

Q4) Attempt ANY FOUR of the following: **[8]**

a. Consider the following graph and write the DFS and BFS traversals.



b. Explain the hash function used in linear probing.
c. Define a Complete Binary Tree.
d. Compare Static Representation and Dynamic Representation of Trees.
e. List the important hash functions.
f. State which tree has a better search efficiency - AVL or Red Black Tree.Justify.

SECTION : D

Q5) Attempt ANY TWO of the following: **[10]**

a. Show the steps of inserting the following data in a AVL tree : 50, 20, 60, 10, 8, 15, 32, 46, 11, 48.
b. Explain Heap Sort with an example.
c. Write a menu driven program to perform the following operations on a graph represented as an adjacency matrix.
    i) Indegree
    ii) Outdegree
d. Write a menu driven program to perform the following operations on binary search tree.
    i) Return the largest element
    ii) Return the smallest element