DATA STRUCTURES AND ALGORITHMS LAB

(Common to CSE, IT, CSE(AI&ML) & CSE(DS))

Course Code: 22CT1106

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COURSE OUTCOMES:

At the end of the course, a student will be able to

CO1: develop programs using recursive functions. (L3)

CO2: implement stacks and queues. (L3)

CO3: develop Programs for searching and sorting techniques. (L3)

CO4: implement different types of trees. (L3)

CO5: apply the concepts of graphs. (L3)

LIST OF PROGRAMS:

(Any 12 programs from the following to be performed)

1. Write a program that uses recursive function to:
   i) Compute factorial of a given number ii) Solve the towers of Hanoi problem.

2. Write a program to implement the following search algorithms on the data contained in file (file type could be any of the following types: .csv, excel, json).
   i) Linear Search ii) Binary Search iii) Fibonacci Search.

3. Write a program to implement the following sorting algorithms on the data contained in file (file type could be any of the following types: .csv, excel, json).
   i)Bubble Sort ii) Insertion Sort iii) Selection Sort

4. Write a program to implement the following sorting algorithms on the data contained in file (file type could be any of the following types: .csv, excel, json).
   i) Quick Sort ii) Merge Sort

5. Write a program that implements the following data structures using arrays:
   i)Stack ii) Queue.

6. Write a program to implement the following Stack applications
   i)Factorial ii) Infix to postfix expression conversion

7. Write a program to implement the following types of queues
   i) Priority Queue ii) Circular Queue.

8. Write a program to implement the following types of Lists
   i)Singly linked list ii) Doubly linked list

9. Write a program to implement binary tree using arrays and to perform binary tree traversals
   i) inorder ii) postorder iii) preorder.

10. Write a program to perform the following operations using linked lists:
    i)Insert an element into a binary search tree.
    ii)Delete an element from a binary search tree.
    iii)Search for a key element in a binary search tree.

11. Write a program to perform the following operations using linked lists:
    i)Insert an element into an AVL tree.
    ii) Delete an element from an AVL tree.

12. Write a program for the implementation of BFS and DFS for a given graph.

13. Write a program to implement a queue using stack.

14. Write a program to implement double stack.

15. Write a program to check whether an expression consists of balanced parenthesis or not using stack

16. Write a program using stack to perform evaluation of postfix expression.

17. Write a program to reverse a linked list.

18. Write a program to interchange two adjacent nodes in a circular linked list.

TEXTBOOKS:

1. Yonghui Wu, Jiande Wang, *Data Structure Practice for Collegiate Programming Contests and Education*, CRC Press, 2016.

REFERENCES:

1. Ellis Horowitz, Sartajsahni, Dinesh Mehta, *Fundamentals of Data structures in C++*, 2nd Edition, University Press (India) Pvt.Ltd.
2. G A V PAI, *Data Structures and Algorithms*, Concepts, Techniques and Applications, Volume-1, 1st Edition, Tata McGraw-Hill, 2008.
3. Richard F. Gilberg&Behrouz A. Forouzan, *Data Structures, A Pseudo code Approach with C*, 2nd Edition, Cengage Learning India Edition, 2007.