INDIAN INSTITUTE OF TECHNOLOGY JODHPUR

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Data Structures and Algorithmic Techniques - CSL7561

Assignment - 1

ASSIGNMENT DEADLINE - 16th January, 11:59 PM

NOTE:

- **You are allowed to use C programming language/ C++ to solve the problems. No other programming language is allowed.**
- **Use of API/ Libraries is strictly forbidden, you all need to write the code from scratch (except for input/ output header files).**
- **Need to submit the assignment before the deadline else your assignment will not be evaluated. No extension requests will be entertained.**
- **A strict plagiarism check using tools will be done on the code. If plagiarism is found in your code, you will be directly awarded zero for that question.**
- **The assignment needs to be submitted individually.**
- **You need to submit your programs (.c/ .cpp files) in a ZIP file. You have the liberty to choose your own input/ output format, hence include a separate pdf file that contains your input/ output format for each question.**

Basic Programming Questions (5 * 4 = 20 marks)

1) Write a program to reverse a string without using libraries.
2) Given a string S, check if it is a palindrome or not, without using libraries.
3) Given two strings A and B, check whether they are Anagrams of each other or not.

4) Given an array of size n, print the difference between the largest and smallest element present in the array.

Data Structure Based Questions (8 * 10 = 80 marks)

5) Create the Stack data structure from scratch using arrays. You will have to implement the Insert, Delete and Stack Trace operations.
6) Create the Queue from scratch using structures and pointers. You will have to implement the Insert, Delete and ‘Display All Elements’ operations.
7) Check if an arithmetic expression has balanced parenthesis or not using the stack data structure.
8) Implement BST(Binary Search Tree) data structure from scratch and perform insertion, search, and deletion operations.
9) Perform Inorder, Preorder, and Postorder tree traversals on BST that you created in question 8. Display all the orders.
10) Implement the Singly Linked list data structure from scratch and perform insertion (at head, at middle and at tail), deletion (at head, at middle and at tail) and search element operations. After each operation, display the elements of the linked list.
11) Create the min-heap data structure, implementing create heap, insert element and delete min operations.
12) Given an array of 'n' elements, find the ‘k’th largest element. Use the max-heap data structure to help solve your purpose.