National University of Computer and Emerging Sciences

Lab Manual 07
Data Structures

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Problem 1:

You are working on a project that involves processing a linked list of student records. Each student record contains the following information:

- Student ID (an integer)
- Name (a string)
- GPA (a float)

You need to perform a specific operation on the linked list using recursion. The operation involves:

- Inserting a new student record with a given name, GPA, and student ID at the end of the list.
- Finding and displaying the names of all students with a GPA greater than 3.5. You are required to implement this functionality using recursive techniques.
- Delete all the students with CGPA less than 2.0
- Print all the students

1. Insertion Operation:

You need to insert a new student record, incorporating the student's name, GPA, and student ID, at the end of the linked list.

Provide a C++ code for a recursive function that inserts a new student record at the end of the linked list.

2. High GPA Student Retrieval:

You must find and display the names of all students in the linked list who boast a GPA greater than 3.5.

Share the C++ code for a recursive function to identify and print the names of high GPA students.

3. Low CGPA Student Deletion:

Your project demands the deletion of all students whose CGPA falls below 2.0.

Provide the C++ code for a recursive function that deletes students with CGPA less than 2.0.

4. Student List Printing:

Lastly, you need to create a recursive function that prints the details of all students in the linked list.

Share the C++ code for a recursive function that prints all student records.

Problem 2: Finding greatest common divisor (GCD)

Write a recursive function to find the greatest common divisor (GCD) of two integers using the Euclidean algorithm. The GCD of two numbers is the largest number that divides both of them without leaving a remainder.

Problem 3: Implementing palindromic partitions

Write a recursive function to generate all possible palindromic partitions of a given string. A palindromic partition is a way to split the string into substrings such that each substring is a palindrome.

Problem 4: Finding subsets of given string

Write the recursive method to find all the subsets of given string. Assume that if the given input

is "abcd", the output will be:

Abcd, abc, abd, ab, acd, ac, ad, a, bcd, bc, bd, b, cd, c

Problem 5: Implementation of Power of a Number

Write a recursive function to calculate the power of a number x raised to the exponent n (x^n).