Crash Course on "Programming in C with Data Structure perspective"

Homework Problems

Session 1 – C Basics, Conditional statements & Looping statements – 21.11.2022

Q1	Develop a simple calculator using conditional statements of C
Q2	Using loops in C implement the following a) Find factorial of a number b) Find the sum of first ‘n’ numbers

Session 2 – Loops and Nested Loops – 22.11.2022

Q1	Print only odd numbers in a range of ‘n’. Use continue statement.
Q2	Print the following pattern 5 5 4 5 4 3 5 4 3 2 5 4 3 2 1
Q3	Print the prime numbers in a given range. Hint: Prime numbers are numbers that are divisible only by 1 and itself.
Q4	Write a program to display multiplication table from 1 to 10.

Session 3 – Arrays – 23.11.2022

Q1	Perform matrix multiplication in C.
Q2	Given a matrix print the transpose of the matrix.
Q3	Insert an element in the beginning, middle, and end of an array.
Q4	Delete an element from the array.

Session 4 – Array operations & Sorting Techniques – 24.11.2022

Q1	Write a menu-driven C program to implement all the array operations discussed in the last session. In addition, also include selection sort and bubble sort of array.

Session 5 – Strings – 25.11.2022

Q1	Find the length of strings without using the built-in function.
Q2	Implement string concatenation of two strings without using a built-in function.
Q3	Implement string reversal without using a built-in function.
Q4	Check whether the given string is palindrome or not.
	Additional problems
Q1	Implement string comparison without using a built-in function.
Q2	Case conversion of string without using a built-in function.
Q3	Implement string reversal but by reducing the loop iterations to half.

Session 6 – Functions – 26.11.2022

Q1	Write C functions to implement the calculator module. Prompt user for the operation.
Q2	Write a function to implement the selection sort of an array. Note: Array must be a parameter to the function. Array size should be a user input.
	Additional Problem
Q3	Rewrite the array operations code implemented (in session 3) using functions. Note: The array size has to be a parameter to the function which has to be altered after each operation accordingly.

Session 7 – Recursion – 28.11.2022

Q1	Write a recursive C function to find the sum of digits of a number.
Q2	Implement binary search technique using simple loops.
Q3	Write a recursive C function to implement binary search in an array.
Q4	Write a recursive C function to find the binary number of a given decimal number.
Q5	Write a recursive C function to find the LCM and GCD of 2 numbers.

Session 8 – Pointers – 29.11.2022

Q1	Write a program in C to print all permutations of a given string using pointers.
Q2	Write a program in C to find the largest element using Dynamic Memory Allocation.
Q3	Write a program in C to Calculate the length of the string using a pointer.
Additional Problem	
Q1	Implement singly linked list using pointers in C as 3 different files (namely adt.h, impl.h, appl.c).

Session 9 – More on Pointers – 05.12.2022

Q1	Use pointers to perform array sorting.
Q2	Explore how 2D Arrays can be referenced with a pointer. Perform Simple input and output of matrix using pointers.

Session 10 – Structures – 06.12.2022

Q1	Create a datatype ‘fraction’ with numerator and denominator. Perform fraction addition, subtraction, multiplication, and division. Note: Find LCM for addition and subtraction problems. Make it a menu-driven program.
Q2	Create a datatype ‘Student’ with name, roll number, and marks for 5 subjects as an array. Maintain an array of student type and sort them based on their total marks in descending order.

Session 11 – File Handling – 07.12.2022

Try file operations in different modes.
Examination Problems to be revisited and tried.

Session 12 – Pointers & Structures – 08.12.2022

Q1	Implement singly linked list in C using structures and pointers with the following functionalities a. Insert front b. Insert end c. Insert in middle d. Delete a node e. Display the list

Session 13 – Discussion of Data Structures – 09.12.2022

** Closure session – all the data structures were introduced, and main algorithms were discussed in class along with some of the problem-solving (tracing) in the same data structure.