PL105 Programming and Problem Solving Lab

Prerequisites: None

List of Sample Lab Assignments

Programs using Conditional/Selection constructs

1. Program to convert polar co-ordinates to Cartesian coordinates and vice-versa.
2. Program to find out the maximum and minimum of three integers read as input.
3. Program to convert lowercase characters to uppercase characters.
4. Program to read an integer 'n' and print whether 'n' is a prime number or not.
5. Program to compute real or imaginary roots of a quadratic equation.

Programs using Arrays, Iterative Constructs and Conditional/Selection constructs

6. Program to read an array of 'n' numbers and to sort it using selection sort algorithm.
7. Program to read an array of 'n' numbers and to sort it using insertion sort algorithm.
8. Program to read an array of 'n' numbers and to sort it using bubble sort algorithm.
9. Consider a matrix of 0's and 1's. A sequence of successive 1's along a row, or a column, or a diagonal is defined to be a line. The number of 1's in a line is called its length. Write a program to find out the line with the maximum length in such a matrix.
10. Program to implement Newton Raphson Method
11. Program to implement Runga Kutta Method

Programs using Recursion

12. Program to compute the greatest common divisor of two positive integers.
13. Program to solve Tower of Hanoi problem.
14. Program to sort an array of integers using Merge Sort.

Programs using Structures and Unions

15. Define a structure for a student having name, roll number and marks obtained in six subjects. Assume that "all students" is an array of students. Write 'C' function to:
    1. Print the name and roll number of the students who have secured the highest marks in each subject;
    2. Print the name and roll number of the student who has secured highest total marks
16. Program to read details of 'n' students and call the above functions.
17. Program to store information of the performance of all cricket players of Indian Team in a dynamic array. For the batsman the following information should be stored - Name, Number of games played, Average runs scored, Number of centuries and fifties scored. For a bowler the information should be: Name, Number of games played, Number of overs bowled, Number of times the bowler has taken five and ten wickets in a match and Average runs given per wicket.

Programs using Pointers

18. Write a function to insert a number properly into an already sorted linked list of numbers. Use this function repeatedly to sort a series of numbers provided at the input.
19. Define a self referential structure for representing a simple linked list of integers. Write a function to split the list into two lists so that the first list contains all even numbered elements and the second list contains only odd numbered elements. For example if the original list is {2, 8, 1, 14, 6, 18, 0, 17} then the resultant first list would be (8, 14, 18, 17) and the second list would be {2,1,6,0}.

Programs using Files

20. Write functions to
    1. Copy the contents of one file to another;
    2. Count the number of words in a file; Assume that a word is a sequence of letters ending with a blank, or a tab, or an end of line marker or end of file or punctuation symbols such as “,” , “.”, “!” and “?”.
21. Program to store information of the performance of all cricket players of Indian Team in a file. For the batsman the following information should be stored - Name, Number of games played, Average runs scored, Number of centuries and fifties scored. For a bowler the information should be: Name, Number of games played, Number of overs bowled, Number of times the bowler has taken five and ten wickets in a match and Average runs given per wicket.
22. Given the data file created in above assignment, Write a program that would search through the file for performance record of a given player and print it to console. The name of the player would be given as input to the program.

A Mini Project – Using all the features covered in ‘C’ / any programming language. The project is to be implemented using multiple files – a header file to store all function prototypes, constants, etc., all project related application functions code in a separate file, all functions code for data validations, etc., in another separate file and the main function code in another file.