COURSE CONTENT

PROGRAMMING FOR PROBLEM SOLVING LAB								
I Semester: CE / CSD / CSE / CSM / ECE / EEE / ME								
Course Code	Category	Hours / Week			Credits	Maximum Marks		
2510571	Foundation	L	T	P	C	CIA	SEE	Total
		0	0	2	1	40	60	100
Contact Classes: Nil	Tutorial Classes: Nil	Practical Classes: 30				Total Classes: 30		
Prerequisites: There are no prerequisites to take this course.								

Course Overview:

This course provides a comprehensive foundation in C programming, focusing on problem-solving, structured program design, and efficient implementation of algorithms. Students will develop logical thinking skills and gain hands-on experience in designing, implementing, and testing programs using core features of the C language.

Course Objectives: The students will learn the following:

1. To work with an IDE to create, edit, compile, run and debug programs
2. To analyze the various steps in program development.
3. To develop programs to solve basic problems by understanding basic concepts in C like operators, control statements etc.
4. To develop modular, reusable and readable C Programs using the concepts like functions, arrays etc.
5. To Write programs using the Dynamic Memory Allocation concept.
6. To create, read from and write to text and binary files

Course Outcomes: After Completion of the Course, Students should be able to:

1. Solve simple numeric problems using C programs involving conditional statements, loops, arithmetic operations, number systems, and series generation.
2. Evaluate expressions and implement logic using decision making, switch cases, looping constructs, recursion, and problem-solving techniques such as prime checking, palindrome detection, and digit manipulation.
3. Develop modular programs using arrays, pointers, and functions for data processing tasks including statistical computation, matrix operations, and array traversal techniques.
4. Implement string manipulation and file handling programs for text processing, character analysis, file copying, merging, and data validation operations.
5. Apply searching and sorting algorithms on integer and string datasets using linear search, binary search, bubble sort, selection sort, and insertion sort techniques.

PRACTICE SESSIONS:

Simple numeric problems:

a) Write a program for finding the max and min from the three numbers.
b) Write the program for the simple, compound interest.
c) Write a program that prints a multiplication table for a given number and the number of rows in the table. For example, for a number 5 and rows = 3, the output should be:

5 x 1 = 5
5 x 2 = 10
5 x 3 = 15

d) Write a program that shows the binary equivalent of a given positive number between 0 to 255.

Expression Evaluation:

a) Write a C program, which takes two integer operands and one operator from the user, performs the operation and then prints the result. (Consider the operators +,-,*, /, % and use Switch Statement).
b) Write a program that finds if a given number is a prime number.
c) Write a C program to find the sum of individual digits of a positive integer and test given number is palindrome.
d) A Fibonacci sequence is defined as follows: the first and second terms in the sequence are 0 and 1. Subsequent terms are found by adding the preceding two terms in the sequence. Write a C program to generate the first n terms of the sequence.

Arrays, Pointers and Functions:

a) Write a C program to find the minimum, maximum and average in an array of integers.
b) Write a C program that uses functions to perform the following:
   I. Addition of Two Matrices
   II. Multiplication of Two Matrices
c) Write a program for reading elements using a pointer into an array and display the values using the array.
d) Write a program for display values reverse order from an array using a pointer.

Files:

a) Write a C program which copies one file to another, replacing all lowercase characters with their uppercase equivalents.
b) Write a C program to merge two files into a third file (i.e., the contents of the first file followed by those of the second are put in the third file).

Strings:

a) Write a C program that uses functions to perform the following operations:
   I. To insert a sub-string into a given main string from a given position.
   II. To delete n Characters from a given position in a given string
b) Write a C program to determine if the given string is a palindrome or not (Spelled same in both directions with or without a meaning like madam, civic, noon, abcba, etc.)
c) Write a C program that displays the position of a character ch in the string S or – 1 if S doesn't contain ch.
d) Write a C program to count the lines, words and characters in a given text.

Sorting and Searching:

a) Write a C program that uses non-recursive function to search for a Key value in a given list of integers using linear search method.
b) Write a C program that uses non-recursive function to search for a Key value in a given sorted list of integers using binary search method.
c) Write a C program that implements the Bubble sort method to sort a given list of integers in ascending order.
d) Write a C program that sorts the given array of integers using selection sort in descending order
e) Write a C program that sorts the given array of integers using insertion sort in ascending order

f) Write a C program that sorts a given array of names.

TEXT BOOKS:

1. Jeri R. Hanly and Elliot B.Koffman, Problem solving and Program Design in C 7th Edition, Pearson.
2. B.A. Forouzan and R.F. Gilberg C Programming and Data Structures, Cengage Learning, (3rd Edition).

REFERENCE BOOKS:

1. Brian W. Kernighan and Dennis M. Ritchie, The C Programming Language, Prentice Hall of India
2. E. Balagurusamy, Computer fundamentals and C, 2nd Edition, McGraw-Hill
3. Yashavant Kanetkar, Let Us C, 18th Edition, BPB
4. R.G. Dromey, How to solve it by Computer, Pearson (16th Impression)
5. Programming in C, Stephen G. Kochan, Fourth Edition, Pearson Education.
6. Herbert Schildt, C: The Complete Reference, Mc Graw Hill, 4th Edition
7. Byron Gottfried, Schaum's Outline of Programming with C, McGraw-Hill

ELECTRONIC RESOURCES:

1. **https://www.geeksforgeeks.org/c/c-programming-language/**
2. **https://www.programiz.com/c-programming**
3. **https://www.w3schools.com/c/**
4. **https://www.codechef.com/learn/course/c**

MATERIALS ONLINE:

1. **Lab Manual**