Semester: I/II			
Course Title	Principles of Programming using C	**CIE Marks**	50
Course Code	BCSESC103/203	**SEE Marks**	50
Course Type	Integrated	**Total Marks**	100
Course Category	ESC	**SEE Duration**	03 hrs
Hours Per Week	2L: 0T: 2P	**SEE Type**	Written
Total Hours	40 hrs	**Credits**	03

Course Learning Objectives
This course will enable the students to
• Demonstrate the basic architecture, functionalities of a computer and C programming principles.
• Apply programming constructs of C language to solve real-world problems.
• Apply user-defined data structures like arrays, structures and pointers in implementing solutions to problems.
• Design and Develop Solutions to problems using structured programming constructs.

Module-1	**(8 hrs)**
Introduction to C: Introduction to computers, input and output devices and program design tools: Algorithms, Flowcharts, Pseudocode. Introduction to C, Structure of C program, Files used in a C program, Compilers, Compiling and executing C programs, Types of errors, variables, constants, Input/output statements in C. **Text Book 1: Chapter 1.1-1.9, 2.1-2.2, 8.4,8.5,9.1-9.14**	
Module-2	**(8 hrs)**
Operators in C: Operators in C, Type conversion, and typecasting. **Decision control and Looping statements:** Introduction to decision control, Conditional branching statements, iterative statements, nested loops, break and continue statements, goto statement. **Text Book 1: Chapter 9.15-9.16, 10.1-10.6**	
Module-3	**(8 hrs)**
Functions: Introduction using functions, Function definition, function declaration, function call, return statement, passing parameters to functions, scope of variables, storage classes, recursive functions. **Arrays:** Declaration of arrays, accessing the elements of an array, storing values in arrays, Operations on arrays: Traversing, Searching and sorting, Passing arrays to functions, applications of arrays. **Text Book 1: Chapter 11.1-11.8,11.10, 12.1-12.4,12.5.1,12.5.5,12.6-12.9,12.12**	
Module-4	**(8 hrs)**
Strings: Introduction, string taxonomy, operations on strings: Length, Concatenation, Comparison and Reversing, Miscellaneous string and character functions, arrays of strings. **Pointers:** Introduction to pointers, declaring pointer variables, types of pointers, passing arguments to functions using pointers **Text Book 1: Chapter 13.1-13.3,13.4.1,13.4.4,13.4.6,13.4.7,13.5,13.6, 14.1-14.7**	
Module-5	**(8 hrs)**
Structure and Union: Introduction, Nested structures, Array of structures, structures and functions, self-referential structures, Unions. **Files:** Introduction to files, using files in C, reading and writing data files. **Text Book 1: Chapter 15.1 – 15.6, 16.1-16.4**	

Practical Components
Demonstration of Computer and Its Accessories: **Laboratory Session-1:** Write up on Functional block diagram of the Computer, Computer and its parts, Motherboard, and I/O Connectors. **Laboratory Session-2:** Write up on the Input and Output devices of the computer. **Note:** The above laboratory sessions are used to fill the gap between theory classes and practical sessions. Students have to prepare a write-up on the same and it will be considered for the evaluation

Sl. No.	Programs for Implementation:
1	Simulation of a Simple Calculator.
2	Compute the roots of a quadratic equation by accepting the coefficients. Print appropriate messages.
3	Write a C program to calculate the Gross Salary of an employee by considering the input as basic salary and include a 5% Dearness Allowance (DA) and a 10% House Rent (HR) allowance, where the Gross Salary is determined as the sum of the basic salary, DA, and HR. Also, calculate the tax deducted for an annual income with the given conditions: If income is less than or equal to 5 lakhs, then no tax. If income is in the range of 5 lakhs to 10 lakhs, then tax is 10%. If income is above 10 lakhs, then the tax is 30%.
4	Write a C Program to display the following by reading the number of rows as input 1 1 2 1 1 2 3 2 1 1 2 3 4 3 2 1 ---------- n^{th} row
5	Sort the given set of N numbers using Bubble sort and implement Binary Search on sorted integ
6	Implement Matrix multiplication and validate the rules of multiplication.
7	Write functions to implement string operations such as compare, concatenate, and find string length. Use the parameter passing techniques.
8	Implement structures to read, write, and compute average- marks of the students, and list the students scoring above and below the average marks for a class of N students.
9	Develop a program using pointers to compute the sum, mean, and standard deviation of all elements stored in an array of N real numbers.
10	Write a C program to copy a text file to another, and read both the input file name and target file name.

Text Book:	
1.	Computer fundamentals and programming in C, Reema Thareja, Oxford University, 3rd Edition, 2023.
Reference Books:	
1.	Programming in ANSI C, E. Bala Guruswamy, Tata McGraw-Hill, 7th Edition.
2.	The ‘C’ Programming Language, Brian W. Kernighan and Dennis M. Ritchie, Prentices Hall of India, Second Edition,

Course Outcome Statements: After the successful completion of the course, the student will be able to	
CO1	Demonstrate the working principles of computers, various functions of peripheral devices, and fundamental concepts of C programming language.
CO2	Apply procedural programming constructs in solving real-world problems.
CO3	Illustrate user-defined data structures such as Arrays in implementing solutions to searching and sorting methods.
CO4	Make use of strings, structures, unions, pointers, and file I/O to solve a realistic problem.
CO5	Design and develop a solution to a problem using modular programming constructs.

Course Articulation Matrix

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	-	1	-	-	-	-	-	-	-	-	1
CO2	2	1	1	1	2	-	-	-	-	-	-	2
CO3	2	1	1	1	2	-	-	-	-	-	-	2
CO4	2	1	1	1	2	-	-	-	-	-	-	2
CO5	1	2	2	2	2	-	-	-	-	-	-	2
Avg.	**1.8**	**1.25**	**1.2**	**1.25**	**2**	-	-	-	-	-	-	**1.8**

3: High, 2: Medium, 1: Low