



Semester*	: II
Course Type	: SEC
Course Code**	: MATDSEC151
Name of the Course	: Mathematical Programming in C (<i>Theory with Practical</i>)
Learning level***	: 150
Credits	: 3
Contact Hours	: 50
Total Marks	: 100
End Semester Marks	: 80 (Theory: 50, Practical: 30)
Internal Marks	: 20

Course Objective

The main objective of this course is to introduce the fundamentals of the C programming language and its application in mathematical programming and to develop problem-solving skills by implementing mathematical algorithms.

THEORY

Unit – I

Introduction to C language, C characters, constants and variables. Arithmetic expression and statement. Input-output statements, assignment statement, printf and scanf statements, declaration statement.

Unit – II

Simple computer programs. Logical expression and statements, logical and relational operators.

Unit – III

Decision control structures and loops: if statement, if-else statement, for loop, while loop, do-while loop, switch statement, break statement, continue statement, go to statement.

Unit – IV

Functions: Defining a function, function prototypes, passing arguments to a function.

Unit – V

Return statement, arrays, defining one and multi-dimensional arrays.

Textbook:

1. E. Balagurusamy, Programming in ANSI C, 8th ed., McGraw Hill Education (India), 2019.

Reference books:

1. T. Jeyapooan, A First Course in Programming with C, 1st ed., Vikas Publishing House, 2004.
2. Y. Kanetkar, Let Us C, 15th ed., BPB Publications, 2016.
3. B.W. Kernighan, D.M. Ritchie, The C Programming Language, 2nd ed., Pearson Education India, 2015.

PRACTICAL

1. Write a program to find the area of a
 - a. circle
 - b. rectangle
 - c. triangle
2. Write a program to determine whether a given year is a leap year or not
3. Write a program to check whether a given character is a vowel or a consonant
4. Write a program to check whether a given positive integer is prime
5. Write a program to find the factorial of a positive integer using a
 - a. loop
 - b. recursive function
6. Write a program to find the sum of the following series for a given positive integer N :
$$1! + 2! + \dots + N!$$
7. Write a program to find the biggest element in an array of integers
8. Write a program to sort a given array of integers in
 - a. ascending order
 - b. descending order
9. Write a program to find
 - a. the sum of two matrices
 - b. the product of two matrices
10. Write a program to find the determinant of a
 - a. 2×2 matrix
 - b. 3×3 matrix
11. Write a program to find the inverse of a
 - a. 2×2 matrix
 - b. 3×3 matrix

Course Learning Outcome

On successful completion of the course, learners will be able to

1. demonstrate a comprehensive understanding of the syntax, variables, and data types used in the C programming language,
2. apply C programming concepts effectively to solve mathematical problems, including calculating areas, determining leap years, and checking for prime numbers,
3. develop efficient C programs to compute factorials, sum of series, and manipulate arrays for mathematical computation,
4. utilise decision control structures (if-else, switch) and loops (for, while, do-while) proficiently in mathematical programming scenarios,
5. design and implement modular programs by defining functions, passing arguments, and using return statements to solve mathematical problems.