

**Course Learning Objectives (CLOs):** The course focuses on the following learning results:

- Developing the problem solving skills that can be applied to problems in different areas which enables students to take-up subsequent course work and professional career.
- Provides a comprehensive study of the features of C programming language.

**Course Outcomes (COs):**

Description of the Course Outcome: At the end of the course the student will be able to:		Mapping to POs(1-12)/ PSOs (13-16)		
		Substantial Level (3)	Moderate Level (2)	Slight Level (1)
<b>CO-1</b>	<b>Design</b> a solution by analyzing the given problem scenario and <b>represent</b> it using algorithm / flowchart.	-	1,2,3	-
<b>CO-2</b>	<b>Explain</b> the C language primitives, language principles and use them in writing simple programs.	-	1,2,3	-
<b>CO-3</b>	<b>Write</b> a C program using proper control structures to solve simple problems.	-	1,2,3	-
<b>CO-4</b>	<b>Write</b> a C program using arrays and strings to solve simple problems.	-	2,6	-
<b>CO-5</b>	<b>Explain</b> the usage and the need for writing modular programs and demonstrate its use in writing programs.	-	-	1,2,3

POs/PSOs	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
<b>Mapping Level</b>	1.7	1.8	1.7	-	-	2.0	-	-	-	-	-	-	-	-	-	-

**Pre-requisites:** NIL

## **Contents:**

### **Unit-I**

**Flow-Chart and Algorithm:** Solving various scientific, engineering and business related problems of varying complexity.

**Fundamentals of C Programming Language:** Program structure and execution. Character set, data types, operators, type conversion, expression evaluation. Input and output statements. **8 Hrs**

### **Unit-II**

**Decision making and Branching:** if statement and its different forms, switch statement. **8 Hrs**

### **Unit-III**

**Decision making and Looping:** loops and their behavior – entry and exit controlled loops, conditional and unconditional jump statements, Nested loops. **8 Hrs**

### **Unit-IV**

**Arrays:** Single and multidimensional arrays, advantages and disadvantages of arrays, searching and sorting

**Strings:** Definition, Different ways of reading and printing strings, string handling functions, applications. **8 Hrs**

### **Unit-V**

**Modular Programming:** Declaration, definition and use of functions, passing parameters to function, Recursion. **8 Hrs**

## **Laboratory Component:**

**Working Platform:** Linux Operating System

## **Expected Coding Practices:**

1. Use of Good Programming practices: Declaration of variables, Indentation, Documentation, Simplicity of logic, Efficiency of logic,

- uniformity etc.
2. Generic and Reusable code.
  3. Inclusions of exceptional cases.
  4. Better usability

### **Course Contents:**

Programming exercises of varying complexity, to meet the learning results stated in course outcomes for this course.

### **Reference Books:**

- 1 E Balagurusamy, "Programming in ANSI C", 6<sup>th</sup> Edition, Tata McGraw Hill, 2012.
- 2 Brian W Kernighan & Dennis M Ritchie, "The C programming language", 2<sup>nd</sup> Edition, Prentice-Hall India, 2004.
- 3 R.G. Dromey., "How to solve it by Computer", Prentice-Hall India,2008
- 4 B A Forouzan and R F Gilberg, "Computer Program: A structured programming approach using C", 3<sup>rd</sup> Edition, Thomson Learning,2005
- 5 Brain W. Kernighan and Rob Pike, "The Practice of Programming", Pearson Education Inc.2008.

**Course Learning Objectives (CLOs):** This course focuses on the following learning perspectives:

- Explore user-defined data structures like structures and pointers in implementing solutions to problems.
- Selection of appropriate data structures for solving a given problem.

**Course Outcomes (COs):**

Description of the Course Outcome: At the end of the course the student will be able to:		Mapping to POs(1-12) / PSOs (13-16)		
		Substantial Level (3)	Moderate Level (2)	Slight Level (1)
<b>CO-1</b>	<b>Explain</b> the usage and the need for writing programs using structures, unions and pointers.	-	1,2,3	-
<b>CO-2</b>	<b>Solve</b> real time problems using concepts of dynamic memory allocation and storage classes.	-	1,2,3	-
<b>CO-3</b>	<b>Construct</b> Programming solutions using user defined functions and files for storage.	-	1,2,3	-
<b>CO-4</b>	<b>Demonstrate</b> sorting and searching algorithms.	-	1,2,3	-
<b>CO-5</b>	<b>Select</b> appropriate programming constructs and data structures to build solutions to variety of problems.	-	1,2,3	12,14

POs/PSOs	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
<b>Mapping Level</b>	2.0	2.0	2.0	-	-	-	-	-	-	-	-	1.0	-	1.0	-	-

**Pre-requisites:** Knowledge of fundamental Principles of Programming.

**Contents:**

### Unit-I

**Pointers:** Introduction, Understanding Pointers, Accessing the address of a variable, Declaration and Initialization of Pointers, Accessing a variable through its pointer, Chain of pointers, Pointer expressions, Pointer Increments and scale factor, Pointers and arrays, Pointers and character strings, Pointers as Function arguments, Functions returning pointers. **8 Hrs**

### Unit-II

**Structures and Unions:** Introduction, Defining a Structure, Declaring structure variables, Accessing structure members, structure initialization, copying and comparing structure variables, Operations on Individual Members, Arrays of structures, Arrays within structures, Structures within structures, Structures and Functions, Self-referential structures, Unions. **8 Hrs**

### Unit-III

**Storage Classes:** Storage class specifiers, Local variable storage class: auto, register, and static. Global variable storage class: default global variable, extern, and static.

**Dynamic Memory allocation:** Motivation for dynamic memory requirement, Allocating a block of memory – malloc, allocating multiple blocks of memory – calloc, Releasing the used memory – free, Altering the size of a block – realloc. **8 Hrs**

### Unit-IV

**File Handling:** Introduction, Defining an opening a file, Closing a file, Input and Output Operations on Files, Error Handling during IO operations, Random Access to Files, Command line arguments. **8 Hrs**

### Unit-V

**Sorting:** Introduction, Bubble Sort, Selection Sort, Insertion Sort.

**Searching:** Introduction, Linear Search, Binary Search. **8 Hrs**

### Reference Books:

- 1 E Balagurusamy, "Programming in ANSI C", 6<sup>th</sup> Edition, Tata McGraw Hill, 2012.
- 2 Yashavant Kanetkar, "Understanding Pointers in C and C++", 5<sup>th</sup> Edition,

BPB Publications, 2019.

- 3** Reema Thareja, "Computer fundamentals and Programming in C", Oxford University, Second Edition, 2017.
- 4** B A Forouzan and R F Gilberg, "Computer Program: A structured programming approach using C", 3<sup>rd</sup> Edition, Thomson Learning, 2005
- 5** Brain W. Kernighan and Rob Pike, "The Practice of Programming", Pearson Education Inc. 2008.