**Subject – Software Foundation with C++**

**Code –**

| **COURSE TITLE** | **Software Foundation with C++** | | | | | | | | |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **COURSE CODE** |  | **TOTAL CREDITS** | **L** | **T** | **P** | **S** | **R** | **O/F** | **C** |
| **3** | **0** | **4** | **0** | **0** | **0** | **5** |
| **PRE-REQUISITE** | **Basic Programming Skills** | **CO-REQUISITE** | **NIL** | | | | | | |
| **ANTI-REQUISITE** | **NIL** |  | | | | | | | |
| **PROGRAMME** | **B.Tech** | | | | | | | | |
| **SEMESTER** | **4** | | | | | | | | |

**Course Objectives:**

1. To introduce fundamental programming concepts using C++.
2. To develop proficiency in problem-solving and algorithm development.
3. To understand the principles of object-oriented programming (OOP) and their implementation in C++.
4. To gain practical experience in software development and debugging using C++.

**Course Outcomes:**

On successful completion of the course, the students will be able to:

**CO1:** Understand basic programming constructs and syntax in C++.

**CO2:** Develop algorithms and implement them using C++.

**CO3:** Design and implement classes and objects following object-oriented principles.

**CO4:** Apply debugging techniques to identify and resolve errors in C++ programs.

**CO5:** Develop small-scale software projects using C++.

**Course Description:**

Software Foundation with C++ provides a foundational understanding of programming principles using the C++ language. The course covers basic to intermediate concepts, including data types, control structures, functions, classes, and object-oriented programming (OOP) principles. Through practical exercises and projects, students will gain hands-on experience in software development, debugging, and problem-solving using C++.

**Text Books:**

1. "C++ Primer" by Stanley B. Lippman, Josée Lajoie, and Barbara E. Moo
2. "Programming: Principles and Practice Using C++" by Bjarne Stroustrup

**Reference Books:**

1. "Effective Modern C++: 42 Specific Ways to Improve Your Use of C++11 and C++14" by Scott Meyers
2. "The C++ Programming Language" by Bjarne Stroustrup
3. "Accelerated C++: Practical Programming by Example" by Andrew Koenig and Barbara E. Moo

**Additional Resources:**

* C++ Documentation **-** <https://devdocs.io/cpp/>
* Cpp Reference - [https://en.cppreference.com/w/](https://en.cppreference.com/w/%20)

| **UNIT-NO** | **CONTENT** | **CONTACT HRS** | **LEARNING OUTCOME** | **KNOWLEDGE LEVELS** | **REFERENCE/**  **LEARNING MATERIALS** |
| --- | --- | --- | --- | --- | --- |
| **I** | **Introduction to C++ Programming:** Overview of programming languages, Introduction to C++ programming language, Basic syntax and structure of C++ programs, Data types, variables, and constants, Input and output operations in C++, Decision-making statements (if, else if, switch), Looping statements (for, while, do-while) | **8** | **C1** | **Remembering**  **Understanding** | **T1/R1** |
| **II** | **Functions and Pointers:** Functions and function prototypes, Function overloading, Recursion and its applications, Pointers and their applications, Dynamic memory allocation, Pointer arithmetic | **8** | **C2** | **Analysing,**  **Understanding** | **T2/R1/R2** |
| **III** | **Object-Oriented Programming (OOP) in C++:**  Introduction to object-oriented programming, Classes and objects, Encapsulation, inheritance, and polymorphism, Constructors and destructors, Operator overloading | **8** | **C3** | **Understanding, Analysing** | **T2/R2** |
| **IV** | **Advanced Concepts in C++:**  Templates and generic programming, Standard Template Library (STL), containers and algorithms, Smart pointers and memory management, Exception handling and error handling, Concurrency and multithreading | **8** | **C4** | **Understanding, Applying** | **T2/R2/R3s** |
| **V** | **Software Development Practices:**  Software development life cycle, Documentation and commenting practices, Debugging techniques and tools, best practices in C++ programming, Introduction to unit testing frameworks | **8** | **C5** | **Applying** | **T2/R3** |