INDIAN INSTITUTE OF TECHNOLOGY ROORKEE

NAME OF DEPT./CENTRE**:** **Electronics and Computer Engineering**

1. Subject Code: **EC – 101A** Course Title: **Computer Systems & Programming**

2. Contact Hours: **L: 3** **T: 0** **P: 2**

3. Examination Duration (Hrs.): **Theory** 0 | 3 **Practical** 0 | 0

4. Relative Weight**:** **CWS** 15 **PRS** 15 **MTE** 30 **ETE** 40 **PRE** 00

5. Credits**:** 0 | 4 6. Semester [ ] **Autumn** [ ] **Spring** [√] **Both**

7. Pre-requisite**: NIL**

8. Subject Area**: ESC**

9. Objective: To introduce the fundamental concepts of Computer Systems hardware and software and to develop basic skills in programming, to prepare for the use of Information Technology tools and techniques.

10. Details of the Course:

Sl. No.	Contents	Contact Hours
1.	**Basic Computer Fundamentals:** Introduction to computer systems; number system, integer, signed integer, fixed and floating point representations; IEEE standards integer and floating point arithmetic; CPU organization, ALU, registers, memory, the idea of program execution at micro level; concept of flow chart and algorithms, algorithms to programs.	7
2.	**Basic Programming Elements in C++: Input/Output:** Constants, variables, expressions and operations; Naming conventions and styles; Conditions and selection statements; Looping and control structures; File I/O, header files, string processing; Pre-processor directives such as #include, #define, #ifdef, #ifndef; Compiling and linking.	8
3.	**Programming Through Functional Decomposition:** Functions (void and value returning), parameters, scope and lifetime of variables, passing by value, passing by reference, passing by constant reference; Design of functions and their interfaces (concept of functional decomposition), recursive functions, function overloading and default arguments; Library functions.	8
4.	**Aggregate Data-types:** Arrays and Pointers, structures, dynamic data and pointers, dynamic arrays; Introduction to data structures, use of pointers in linked structures.	7

5.	**Object Oriented Programming:** Data hiding, abstract data types, classes, access control; Class implementation – default constructor, constructors, copy constructor, destructor, operator overloading, friend function; Object oriented design, inheritance and composition; Dynamic binding and virtual functions; Polymorphism; Dynamic data in classes.	12
	Total	**42**

11. Suggested Books:

Sl. No.	**Name of Books / Authors**	**Year of Publication**
1.	Dietel, H.M. and Dietel, P.J., "C++ How to Program", Prentice Hall.	2004
2.	Nell Date, Chip Weema and Mark Headington, "Programming and Problem Solving with C++", CBS Publishers and Distribution.	2000
3.	Cohoon, J.P. and Davidson, J.W., "C++ Program Design", Tata McGraw Hill.	2005