

**Maulana Abul Kalam Azad University of Technology, West Bengal**  
*(Formerly West Bengal University of Technology)*  
**1<sup>st</sup> Year Curriculum Structure for B.Tech courses in Engineering & Technology**  
 (Applicable from the academic session 2018-2019)

<b>Course Code :</b> ES-CS201	<b>Category :</b> Engineering Science Courses
<b>Course Title :</b> Programming for Problem Solving	<b>Semester :</b> Second
<b>L-T-P :</b> 3-0-0	<b>Credit:</b> 3
<b>Pre-Requisites:</b>	

*Detailed contents*

**Unit 1:** Introduction to Programming (**4 lectures**)

- Introduction to components of a computer system (disks, memory, processor, where a program is stored and executed, operating system, compilers etc.) - (**1 lecture**).
- Idea of Algorithm: steps to solve logical and numerical problems. Representation of Algorithm: Flowchart/Pseudocode with examples. (**1 lecture**)
- From algorithms to programs; source code, variables (with data types) variables and memory locations, Syntax and Logical Errors in compilation, object and executable code- (**2 lectures**)

**Unit 2:** Arithmetic expressions and precedence (**2 lectures**)

**Unit 3:** Conditional Branching and Loops (**6 lectures**)

- Writing and evaluation of conditionals and consequent branching (**3 lectures**)
- Iteration and loops (**3 lectures**)

**Unit 4:** Arrays (**6 lectures**)

- Arrays (1-D, 2-D), Character arrays and Strings

**Unit 5:** Basic Algorithms (**6 lectures**)

- Searching, Basic Sorting Algorithms (Bubble, Insertion and Selection), Finding roots of equations, notion of order of complexity through example programs (no formal definition required)

**Unit 6:** Function (**5 lectures**)

- Functions (including using built in libraries), Parameter passing in functions, call by value, Passing arrays to functions: idea of call by reference

**Unit 7:** Recursion (**4 -5 lectures**)

- Recursion, as a different way of solving problems. Example programs, such as Finding Factorial, Fibonacci series, Ackerman function etc. Quick sort or Merge sort.

**Unit 8:** Structure (**4 lectures**)

- Structures, Defining structures and Array of Structures

**Unit 9:** Pointers (**2 lectures**)

- Idea of pointers, Defining pointers, Use of Pointers in self-referential structures, notion of linked list (no implementation)

**Unit 10:** File handling (only if time is available, otherwise should be done as part of the lab)

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### **Course Outcomes**

The student will learn

- To formulate simple algorithms for arithmetic and logical problems.
- To translate the algorithms to programs (in C language).
- To test and execute the programs and correct syntax and logical errors.
- To implement conditional branching, iteration and recursion.
- To decompose a problem into functions and synthesize a complete program using divide and conquer approach.
- To use arrays, pointers and structures to formulate algorithms and programs.
- To apply programming to solve matrix addition and multiplication problems and searching and sorting problems.
- To apply programming to solve simple numerical method problems, namely root finding of function, differentiation of function and simple integration.

### **Learning Resources:**

1. Byron Gottfried, Schaum's Outline of Programming with C, McGraw-Hill
2. E. Balaguruswamy, Programming in ANSI C, Tata McGraw-Hill
3. Brian W. Kernighan and Dennis M. Ritchie, The C Programming Language, Prentice Hall of India
4. R. S. Salaria, Computer Concepts and Programming in C, Khanna Publishers