

## **Paper II – Problem Solving through C programming**

### **Unit I**

Overview of computer system architecture: Simple model of a computer to explain how it executes algorithms, CPU, memory, I/O units main and secondary memory. CPU structure, machine instruction, operation code and operand location, instruction counter, fetch and execute cycles in a computer. Arithmetic and logic operations.

Memory locations, address and contents, read and write operations. Difference between low level and high level languages, hierarchy of programming languages.

Computer generations: First, second, third, fourth, fifth generations.

Types of computers: Mainframe, Mini, super computers, micro computers.

### **Unit II**

Algorithm and algorithm development: Definition and properties of algorithm, flow chart symbols, conversion of flow chart to language, example of simple algorithms. Program design, errors : syntax error, runtime error, logic error, debugging, program verification, testing, documentation and maintenance.

### **Unit III**

Introduction to C: Variables and arithmetic expressions, the for statement, symbolic constants, character input and output, arrays, functions, arguments- call by value, character arrays, external variables and scope.

Types, Operators and Expressions: Variable names, data type and sizes, constants, declarations, arithmetic operators, relational and logical operators, type conversions, increment and decrement operators, bitwise operators, assignment operators and expressions, conditional expressions, precedence and order of evaluation.

Control Flow: Statements and blocks, if-else, else-if, switch, loops- while and for, loops- do-while, break and continue, goto and labels.

### **Unit IV**

Functions and Program Structure: Basics of function, functions returning non-integers, external variables, scope rules, header files, static variables, register variables, block structure, initialization, recursion, the C preprocessor.

Pointer and Arrays: Pointers and addresses, pointers and function arguments, pointers and arrays, address arithmetic. Character pointers and functions, pointer arrays: pointers to pointers, multi-dimensional arrays, pointers vs. multi-dimensional arrays. Pointers to functions. Complicated declarations.

### **Unit V**

Structures: Basics of structures, structures and functions, arrays of structures, pointers to structures, self-referential structures, table lookup, typedef, unions, bit-fields.

Input and Output: Standard input and output. Formatted output- printf, variable length argument lists. Formatted input- scanf, file access, error handling- stderr and exit, line input and output, miscellaneous functions.

### **Suggested Books**

1. Deendayalu R., Computer science Volume I and II, Second Edition, Tata McGraw-Hill Publishing Company Limited, New Delhi.
2. Rajaraman V., Fundamentals of computers, Second Edition, Prentice Hall of India Private Limited, New Delhi.
3. Kernighan B.W. and Ritchie D.M., The C Programming Language, Prentice Hall of India Private Limited New Delhi.
4. Drogmey R., How to solve it by computers. Prentice Hall of India Private Limited , New Delhi.