

PROBLEM SOLVING TECHNIQUES USING C

COURSE CREDITS: 03

NO OF HOURS: 45

COURSE OUTCOMES (COS):

CO1: Design and implement new algorithms to solve advanced problems, optimising their performance using growth function and asymptotic analysis.

CO2: Apply knowledge of programming fundamentals, concepts by using the syntax of tokens input/output operations and control statements.

CO3: Apply knowledge of arrays, character arrays, strings, and user-defined functions to develop robust code structures that solve specific problems.

CO4: Apply knowledge of structures and union, pointer, files and command line argument to develop robust code to solve specific problems.

UNIT I

10 Hours

Introduction: The Role of Algorithms in Computing, Algorithms as a technology, Steps to Solve a Problem, Analysing algorithms, Designing algorithms, Growth of Functions, Asymptotic notation, Standard notations and common functions.

Fundamental Algorithms: Exchanging the values of two variables, Counting, Summation of a set of numbers, Factorial Computation, Generating of the Fibonacci sequence, Reversing the digits of an integer, Character to number conversion.

UNIT II

12 Hours

Introduction to C: Importance of C - Structure of C Program - Creating and Executing a C program - Programming Style - Character set - C tokens: Identifiers – Keywords - Data types – Variables – Constants - Defining Symbolic Constants - Operators in C - Evaluation of Expression - Precedence of Arithmetic Operators - Type Conversions in Expressions.

Managing Input and Output Operation: Formatted and Unformatted I/O Functions.

Decision making and Branching: Decision Making Statements - if Statement- if–else statement - nesting of if-else statements - else–if ladder - switch statement - ?: operator

Decision Making and Looping: The While Statement - The do-while - The for Statement - Nested loop - Jumps in loops: break-continue-goto.

UNIT III

12 Hours

Arrays: Introduction - One Dimensional Array - Two Dimensional Arrays - Multidimensional Arrays.

Character Arrays and Strings: Declaring and Initializing String Variables, Reading Strings from Terminal, Writing Strings to Screen, Arithmetic Operations on Characters, String-handling

Functions - Element of User-defined Functions - Category of Functions – Recursion - Passing Arrays to Functions - The Scope and lifetime of Variables.

UNIT IV

11 Hours

Pointers: Understanding Pointers - Pointers and Arrays - Pointers and Character Strings - Pointer and Structures.

Structure and Union: Defining a Structure - Declaring Structure Variables - Accessing Structure members - Arrays of Structures - Union.

Files: Defining and Opening a file - Closing a File – Input/ Output Operations on files.
Command line arguments.

Text Books:

1. R.G.Dromey, *How to Solve it by Computer*, India:Pearson Education, 2008.
2. E. Balagurusamy, *Programming in ANSI C*, 8th ed., Mc Graw Hill, 2019
3. Thomas H. Cormen, Charles E. Leiserson, Ronald L. Rivest, Clifford Stein, *Introduction to Algorithms*, 3rd ed., Massachusetts London, England:The MIT Press Cambridge, 2008.
4. Brain M. Kernighan, and Dennis M. Ritchie, *The C Programming Language*, 2nd ed., Princeton Hall Software Series, 2012.

Reference Books:

1. Steven S. Skiena, *The Algorithm Design Module*, 2nd ed., London:Springer-Verlag, 2008.
2. Donald E. Knuth, *The Art of Computer Programming, Volume 1: Fundamental Algorithms*, 3rd ed., Addison Wesley Longman, 1997.
3. Donald E. Knuth, *The Art of Computer Programming, Volume 2: Seminumerical Algorithms*, 3rd ed., Addison Wesley Longman, 1998.
4. Greg Perry and Dean Miller, *C programming: Absolute Beginner's Guide*, 3rd ed., Pearson Education, Inc, 2014.