CA-C2T: PROBLEM SOLVING TECHNIQUES

Total Teaching Hours: 48   No. of Hours / Week: 03

UNIT - I   [12 Hours]
Introduction: The Role of Algorithms in Computing, Algorithms as a technology, Analyzing 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]
C Programming: Getting Started, Variables and Arithmetic expressions. Input and Output: Standard input and output, formatted output- printf, variable length argument list, formatted input-scanf. Control Flow: Statements and Blocks, If-else, else-if, switch, loops: while loop, for loop, do while, break and continue, goto and labels. Pointers and Arrays: pointers and address, pointers and function arguments, multidimensional array, initialization of pointer arrays, command line arguments.

UNIT - III   [12 Hours]
Factoring Methods: Finding the square root of a number, the smallest Divisor of an integer, the greatest common divisor of two integers, computing the prime factors of an integer, generation of pseudo random numbers, raising a number to a large power. Array Techniques: Array order Reversal, Array counting or Histogramming, Finding the maximum number in a set, removal of duplicates from an ordered array, partitioning an array, Finding the kth smallest element, multiplication of two matrices.

UNIT - IV   [12 Hours]
Merging: the two-way merge. Sorting: Sorting by selection, sorting by exchange, sorting by insertion, sorting by diminishing increment, sorting by partitioning. Searching: binary search, hash search. Text processing and Pattern searching: text line length adjustment, keyword searching in text, text line editing, linear pattern search

Text Books:
1. R.G.Dromey, "How to Solve it by Computer", Pearson Education India, 2008.
2. Thomas H. Cormen, Charles E. Leiserson, Ronald L. Rivest, Clifford Stein, "Introduction to Algorithms", 3rd Edition, The MIT Press Cambridge, Massachusetts London, England, 2008
3. Brain M. Kernighan, and Dennis M. Ritchie, "The C Programming Language", 2nd edition, Princeton Hall Software Series, 2012.

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

Web Resources:
1. http://algorithmsforinterviews.com "Algorithms for Interviews"