

MA 7104 ALGORITHMS AND COMPLEXITY THEORY

(Pre-requisite: Nil)

Total hours: 56

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Module I: (14 hours)

Preliminaries: algorithms and their cost – cost measurement – worst case an Average cost – L and Dau's
Notations – running time calculation: model of computing, comparison of algorithms – Space complexity
– reduction of spatial complexity

Module II: (14hours)

The principle of induction – recursive procedures – correctness of algorithms – Induction procedure of recursive algorithm and iterative algorithm – discrete Fourier transform – loop invariant theorem – strings-representation and manipulation using arrays and lists- string matching algorithms. Brute force, Knuth-Morris-Pratt and Boyer-Moore strategies.

Module III: (14 hours)

Selection sort – bubble, insertion, shell sort – tree sort, pseudo code of tree sort - quick sort – Naïve algorithm, Quick sort analysis and its complexity – average and worst case analysis of quick sort – merge sort analysis and complexity – Radix and Bucket sort – external sort.

Module IV: (14 hours)

Deterministic and non-deterministic algorithm - satisfiability - reducibility - NP-Complete Problems: Basic Concepts, NP-Hard - NP-Complete Problem - halting problem – NP hard graph and scheduling problem.

References:

1. Baase S. and Gelder A., Computer Algorithms: Introduction to Design and Analysis, Addison Wesley, 2000.
1. 2.Knuth D.E., The art of Computer Programming: Fundamental Algorithms, Addison-Wesley,1997.
2. T.H. Cormen, C.E. Leiserson, R.L. Rivest, C. Stein: Introduction to Algorithms, The MIT Press, 2nd Edn, 2001.