

TIT 1101 Computability and Complexity Theory

Module-I +II

Basic background on automata and languages, Types of automata and language, Turing machines, k-tape Turing machines, non-deterministic Turing machines, Universal Turing machine, Halting problem, Recursive enumerable languages, Recursive languages, Decidable and recognizable language, Turing-decidable languages, Turing-recognizable languages, Context Sensitive Language and Chomsky Hierarchy.

Module-III+IV

Primitive recursive function, partial recursive function, Recursive and recursive enumeration sets, Programming systems, Unsolvable problems, a non-recursive language and an unsolvable problem, Reducing one problem to another problem, Rice Theorem, More unsolvable problems, PCP

Module-V + VI

Measuring complexity- Big O and small o, Analyzing algorithms, Time and space complexity of a Turing machine, Complexity classes: P, NP, NP-C, NP-Complete problem. Additional NP-complete problems- clique, vertex cover, Hamiltonian cycle, coloring problem, graph isomorphism, Reduction from NP-C problem to another problem.

Module-VII

Tractable and Intractable problems

Text Books

1. Lewis H.R., Papadimitriou C.H.- Elements of the Theory of Computation:, PHI Publ. . 2nd edition, New Delhi
2. John Martin. *Introduction to Languages and the Theory of Computation*, 3rd ed. McGraw Hill, New York, NY, 2003.

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Sandip Dutta

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25/7/2016

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MSE 1123 Computability and Complexity Theory

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Samalip Dutta

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25/11/2016

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MCA 1107 DISCRETE MATHEMATICS

Module-I

Relations and digraphs: Product sets and partitions, Relations and Digraphs, Paths in relations and digraphs, equivalence relation, operations on relations, Transitive closure and Warshall's algorithm

Module-II

Functions: Functions for Computer Science, Growth of functions, Permutation functions.

Module-III

Order Relations and Structures: Partially ordered sets, External elements of partially ordered sets, Lattices, Finite Boolean Algebra, Functions on Boolean Algebra, Circuit design

Module-IV

Tree: Trees, Labelled trees, Tree searching, Undirected trees, Minimum Spanning trees

Module-V

Graph: Terminologies, connected graphs, Euler graph, Hamiltonian path and circuit Hamiltonian path and circuits, Transport network, Matching problems,, Graph colouring.

Module-VI

Group: Properties and Operations, Semi group, Products and Quotients of Semigroups, Groups, Products and Quotients of Groups , Other Mathematical structures,

Module-VII

Coding: Codewords and code, Encoding function, Hamming distance, Error detection and correction codes, Pre-fix code

Text book

1. Kolman, Busby, Ross, Rehmann: *Discrete Matheamtical Structures*, 5/e, Pearson Education, 2006.

Handwritten notes and signatures at the bottom of the page:

- Handwritten signature: *Handip Datta*
- Date: *25/7/2016*
- Handwritten signature: *Julie*
- Handwritten signature: *Arjun*