MANIPAL UNIVERSITY JAIPUR

School of Computing and Information Technology

Department of Computer Science and Engineering
Course Hand-out

Formal Language and Automata Theory | CS 1504 | 4 Credits

Session: 2015-2016 | Faculty: Satyabrata Roy

Course Outcomes: At the end of the course, students will be able to

[CS 1504.1]. Develop abstract models such as finite automata, finite automata with outputs, pushdown automata, linear bounded automata and Turing machines based on any problem specified in formal language.

[CS 1504.2]. Compare the characteristics of different types of formal languages and grammars as mentioned in Chomsky Hierarchy.

[CS 1504.3]. Demonstrate skill development related to computational problems and examine the decidability of them by constructing Turing machines and propose an optimal abstract model that can be applied to a suitable real life problem.

[CS 1504.4]. Inspect the performance of each phase of a compiler and compare the working principles of different types of parsers.

[CS 1504.5]. Construct optimized compiler using various type checking rules and concepts of storage organizations.

A. SYLLABUS

Introduction: Automata Theory: Mathematical Preliminaries and Notation :Review of set theory, function, relation; Finite Automata: Deterministic and Non Deterministic Finite Automata (FA), Regular languages, Mealy and Moore machine; Regular Sets and Regular Grammars: Chomsky Hierarchy, Regular Expressions, Regular Grammar and FA, Pumping Lemma for Regular Languages; Context Free Languages (CFL) and Grammars: Ambiguity, Methods for Transforming Grammars; Push Down Automata: Nondeterministic Pushdown Automata (NPDA), Design of NPDA, PDA and CFLs; Introduction to Turing machine; Introduction to Compiler Design: Structure of a Compiler; Lexical Analysis, Recognition of Tokens; Introduction to LR Parsing: Simple LR, More Powerful LR Parsers Generators; Syntax Directed Translations; Type Checking: Rules for Type Checking, Storage Organization.

B. TEXT BOOKS

i. An Intorduction to Formal Languages and Automata – Peter Linz, Jones and Bartlett Student Edition, Fifth Edition, 2010.
ii. Compilers : Principles, Techniques and Tools – A. Aho, J. Ullman, M. S. Lam, R. Sethi, Pearson Education, 2nd Edition, 2007.

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