I YEAR SEM-II B.Tech CSE	CORE	L	T	P	C
CODE:CS1203	FORMAL LANGUAGES AND AUTOMATA THEORY	2	2	0	4

UNIT I: Introduction to Automata:

Strings, Alphabet, Language, Operations, Finite state machine, definitions, finite automaton model, acceptance of strings, and languages, deterministic finite automaton and non-deterministic finite automaton, transition diagrams and Language recognizers.

UNIT II: Finite Automata

NFA with Ɛ transitions - Significance, acceptance of languages. Conversions and Equivalence : Equivalence between NFA with and without Ɛ transitions, NFA to DFA conversion, minimization of FSM, equivalence between two FSM's, Finite Automata with output- Moore and Melay machines.

UNIT III: Regular Languages

Regular sets, regular expressions, identity rules, Constructing finite Automata for a given regular expressions, Conversion of Finite Automata to Regular expressions. Pumping lemma of regular sets, closure properties of regular sets (proofs not required).

UNIT IV: Grammars

Regular grammars: Right linear and left linear grammars, equivalence between regular linear grammar and FA, inter conversion, Context free grammar, derivation trees, and sentential forms. Right most and leftmost derivation of strings.

Context Free Grammars: Ambiguity in context free grammars. Minimization of Context Free Grammars.Chomsky normal form, Greiback normal form, Pumping Lemma for Context Free Languages. Enumeration of properties of CFL (proofs omitted).

UNIT V: Push Down Automata

Push down automata, definition, model, acceptance of CFL, Acceptance by final state and acceptance by empty state and its equivalence. Equivalence of CFL and PDA, interconversion. (Proofs not required). Introduction to DCFL and DPDA.

UNIT VI: Turing Machine & Computability Theory

Turing Machine, definition, model, design of TM, Computable functions, recursively enumerable languages. Church's hypothesis, counter machine, types of Turing machines (proofs not required). Chomsky hierarchy of languages, linear bounded automata and context sensitive language, LR(0) grammar, decidability of, problems, Universal Turing Machine, undecidability of posts. Correspondence problem, Turing reducibility, Definition of P and NP problems, NP complete and NP hard problems.

Text Books:

1. Hopcroft, J D Ullman "Introduction to Automata and Language Theory", 3rd Edition, 2006
2. C. Papadimitrou and C. L. Lewis. Elements of Theory of Computation, Prentice-Hall, 1981.

Reference Books:

1. Introduction to theory of computation by Michael Sisper, Theory of computation by Rajesh K. Shukla, C. Papadimitrou and C. L. Lewis.Elements of Theory of Computation, Prentice-Hall, 1981.

Resources:

NPTEL: Prof Kamala Mrithivasan, IITM