# SYLLABUS

## ANNA UNIVERSITY, CHENNAI

For B.E., Computer Science and Engineering / B.Tech., IT Branches

## THEORY OF COMPUTATION

**UNIT I AUTOMATA AND REGULAR EXPRESSIONS** 9

Need for automata theory - Introduction to formal proof - Finite Automata (FA) - Deterministic Finite Automata (DFA) - Non-deterministic Finite Automata (NFA) - Equivalence between NFA and DFA - Finite Automata with Epsilon transitions - Equivalence of NFA and DFA - Equivalence of NFAs with and without ε-moves - Conversion of NFA into DFA - Minimization of DFAs.

**UNIT II REGULAR EXPRESSIONS AND LANGUAGES** 9

Regular expression - Regular Languages - Equivalence of Finite Automata and regular expressions - Proving languages to be not regular (Pumping Lemma) - Closure properties of regular languages.

**UNIT III CONTEXT FREE GRAMMAR AND PUSH DOWN AUTOMATA** 9

Types of Grammar - Chomsky's hierarchy of languages - Context-Free Grammar (CFG) and Languages - Derivations and Parse trees - Ambiguity in grammars and languages - Push Down Automata (PDA): Definition - Moves - Instantaneous descriptions - Languages of pushdown automata - Equivalence of pushdown automata and CFG-CFG to PDA-PDA to CFG - Deterministic Pushdown Automata.

**UNIT IV NORMAL FORMS AND TURING MACHINES** 9

Normal forms for CFG - Simplification of CFG - Chomsky Normal Form (CNF) and Greibach Normal Form (GNF) - Pumping lemma for CFL - Closure properties of Context Free Languages - Turing Machine : Basic model - definition and representation - Instantaneous Description - Language acceptance by TM - TM as Computer of Integer functions - Programming techniques for Turing machines (subroutines).

**UNIT V UNDECIDABILITY** 9

Unsolvable Problems and Computable Functions - PCP-MPCP - Recursive and recursively enumerable languages - Properties - Universal Turing machine - Tractable and Intractable problems - P and NP completeness - Kruskal's algorithm - Travelling Salesman Problem - 3-CNF SAT problems.

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