

OBJECTIVE

Learning about automata, grammar, language, and their relationships. Further, gives an understanding of the power of Turing machine, and the decidable nature of a problem. Also, gives the idea on some new trends and applications.

UNIT – I REGULAR LANGUAGES 10

Finite Automata (FA) – Deterministic Finite Automata (DFA) – Non-deterministic Finite Automata (NFA) – Finite Automata with Epsilon transitions - Regular Expression – FA and Regular Expressions – Pumping lemma for Regular languages - Equivalence and minimization of Finite Automata.

UNIT – II CONTEXT FREE LANGUAGES 10

Context-Free Grammar (CFG) – Parse Trees – Ambiguity in grammars and languages – Equivalence of Parse trees and derivation - Normal forms for CFG - Definition of the Pushdown automata – Languages of a Pushdown Automata – Equivalence of Pushdown automata and CFG – Pumping lemma for CFL.

UNIT – III CLOSURE PROPERTIES AND TURING MACHINES 8

Closure properties of Regular Sets: Complement and Intersection – Closure properties of CFL: Union, Concatenation, Kleene Closure, Intersection and Complement – Turing Machines – Language of a Turing machine – Turing machine as a computing device - Various techniques for construction of TMs – Equivalence of one tape and multi-tape Turing machines.

UNIT – IV UNDECIDABILITY 8

A language that is not Recursively Enumerable (RE) – An undecidable problem that is RE – Undecidable problems about Turing Machine – Rice theorem for Recursive and Recursively enumerable languages – Post's Correspondence Problem.

UNIT – V RECENT TRENDS & APPLICATIONS 9

Matrix grammar – Programmed grammar – Random context grammar – Regular Control grammar – Lindermyer systems – A glance on DNA computing and Membrane computing.

TOTAL : 45

TEXT BOOKS:

1. John E. Hopcroft and Jeffery D. Ullman, Introduction to Automata Theory, Languages and Computations, Narosa Publishing House, Delhi, 1989.
2. Kamala Krithivasan and R. Rama, Introduction to Formal Languages, Automata Theory and Computation, Pearson Education, Delhi, 2009.

REFERENCES:

1. Harry R. Lewis and Christos H. Papadimitriou, Elements of the theory of Computation, Second Edition, Prentice-Hall of India Pvt. Ltd, 2003.
2. J. Martin, Introduction to Languages and the Theory of Computation, Third Edition, Tata Mc Graw Hill, New Delhi, 2003.
3. Micheal Sipser, "Introduction of the Theory and Computation", Thomson Learning, 1997.