**Theoretical Foundations of Computer Sciences**

**UNIT 1** Mathematical preliminaries – Sets, operations, relations, strings, closure of relation, countabilityanddiagonalization, induction and proof methods- pigeon-hole principle ,concept of language, formal grammars, Chomsky hierarchy.

**UNIT 2** Finite Automaton, regular languages, deterministic & non deterministic finite automata, Eclosures, minimization of automata, equivalence, Moore and Mealy machine.

**UNIT 3** Regular expression, identities, Regular grammar, right linear, left linear, Arden theorem, Pumping lemma for regular sets, closure & decision properties for regular sets, Context free languages, parse trees and ambiguity, reduction of CFGS, Normal forms for CFG .

**UNIT 4** Push down Automata (PDA), non-determinism, acceptance by two methods and their equivalence, conversion of PDA to CFG, CFG to PDAs, closure and decision properties of CFLs, pumping lemma for CFL

**UNIT 5** Turing machines, TM as acceptor, TM as transducers, Variations of TM, linear bounded automata, TM as computer of function.

**UNIT 6** Recursively enumerable (r.e.) set, recursive sets, Decidability and solvability, Post correspondence Problem (PCP), Introduction to recursive function theory, primitive recursive functions, Ackerman function

**Text Books:** Introduction Of Automata Theory, Languages and computation- Hopcroft, Motwani&Ulman Introduction to formal languages and automata – Peter Linz. Introduction to Theory of Computation –Michael Sipser. Reference Books: Theory Of Computer Science –Mishra and Chandrashekharan, Theory Of Computation –John C. Martin