

PECS5304 **THEORY OF COMPUTATION** (3-0-0)

Module – I

10 Hrs

Alphabet, languages and grammars. Production rules and derivation of languages. Chomsky hierarchy of languages. Regular grammars, regular expressions and finite automata (deterministic and nondeterministic). Closure and decision properties of regular sets. Pumping lemma of regular sets. Minimization of finite automata. Left and right linear grammars.

Module – II

12 Hrs

Context free grammars and pushdown automata. Chomsky and Greibach normal forms. Parse trees, Cook, Younger, Kasami, and Early's parsing algorithms. Ambiguity and properties of context free languages. Pumping lemma, Ogden's lemma, Parikh's theorem. Deterministic pushdown automata, closure properties of deterministic context free languages.

Module – III

14 Hrs

Turing machines and variation of Turing machine model, Turing computability, Type 0 languages. Linear bounded automata and context sensitive languages. Primitive recursive functions. Cantor and Godel numbering. Ackermann's function, mu-recursive functions, recursiveness of Ackermann and Turing computable functions. Church Turing hypothesis. Recursive and recursively enumerable sets.. Universal Turing machine and undecidable problems. Undecidability of Post correspondence problem. Valid and invalid computations of Turing machines and some undecidable properties of context free language problems. Time complexity class P, class NP, NP completeness.

Text Books:

1. Introduction to Automata Theory, Languages and Computation: J.E. Hopcroft and J.D Ullman, Pearson Education, 3rd Edition.
2. Introduction to the theory of computation: Michael Sipser, Cengage Learning
3. Theory of computation by Saradhi Varma, Scitech Publication

Reference Books:

1. Introduction to Languages and the Theory of Computation: Martin, Tata McGraw Hill, 3rd Edition
2. Introduction to Formal Languages, Automata Theory and Computation: K. Kirthivasan, Rama R, Pearson Education.
3. Theory of computer Science (Automata Language & computations) K.L. Mishra N. Chandrashekhar, PHI.
4. Elements of Theory of Computation: Lewis, PHI
5. Theory of Automata and Formal Languages: Anand Sharma, Laxmi Publication
6. Automata Theory: Nasir and Srimani, Cambridge University Press.
7. Introduction to Computer Theory: Daniel I.A. Cohen, Willey India, 2nd Edition.