Course Code: PCCCS502 - Formal Language and Automata Theory
Credit: 3
Detailed Syllabus:

Module 1: 5L
Introduction: Alphabet [1L], languages and grammar [1L], productions and derivation [1L], Chomsky Hierarchy of Languages [1L].

Module 2: 10L
Regular languages and finite automata: Regular expressions and languages [1L], deterministic finite automata (DFA) and equivalence with regular expressions [2L], nondeterministic finite automata (NFA) and equivalence with DFA [2L], regular grammars and equivalence with finite automata [2L], properties of regular languages [1L], pumping lemma for regular languages [1L], minimization of finite automata [1L].

Module 3: 12L
Context free languages and pushdown automata: Context free grammars (CFG) and languages (CFL) [2L], Chomsky and Greibach normal forms [2L], nondeterministic pushdown automata (PDA) and equivalence with CFG [2L], parse trees, ambiguity in CFG [2L], pumping lemma for context free languages [2L], deterministic pushdown automata, closure properties of CFLs [2L].

Module 4: 4L
Context-sensitive languages and Turing machine: Context-sensitive grammars (CSG) and languages [1L], linear bounded automata and equivalence with CSG [1L]. Turing machines: The basic model for Turing machines (TM), Turing recognizable (recursively enumerable) and Turing decidable (recursive) languages and their closure properties [1L], variants of Turing machines, nondeterministic TMs and equivalence with deterministic TMs, unrestricted grammars and equivalence with Turing machines, TMs as enumerators [1L].

Module 5: 5L
Undecidability: Church Turing thesis [1L], universal Turing machine, the universal and diagonalization languages [2L], reduction between languages and Rice s theorem [1L], undecidable problems about languages [1L].

Textbook and Reference books:

1. *An Introduction to Formal Languages and Automata* " by Peter Linz.
2. Introduction to Theory of computation by M. Sipser.
3. Introduction to automata theory, languages and computation, J. Ullman and J. Hopcroft