

Course Code	Course Title				Core/Elective		
U21PCN05CS	Automata Languages and Computation				Core		
Prerequisite	Contact Hours per week				CIE	SEE	Credits
	L	T	D	P			
Logic and Switching Theory, Data Structures	3	-	-	-	30	70	3
Course Objectives: <ul style="list-style-type: none"> Understand the relationships among machines, languages and computational problems. Design abstract models for formal languages. Determine the decidability of computational problems. 							
Course Outcomes: After completing this course, the student will be able to: <ul style="list-style-type: none"> Design Finite Automata for Regular languages. Apply formal mathematical methods to prove properties of languages, grammars and automata. Analyze the language and Design pushdown automata. Design Turing machines for simple problems. Describe and determine the undecidability of a problem. 							

UNIT – I

Automata: Introduction to Finite state automata, Central Concepts of Automata theory.
 Finite Automata: Deterministic finite Automata, Non-deterministic finite state automata, Finite Automata with Epsilon -Transitions, Applications of Finite Automata.

Regular Expressions and Languages: Regular expressions, Applications of Regular expressions, Algebraic Laws for Regular expressions,

UNIT-II

Properties of Regular Languages: Properties of regular sets, Pumping Lemma, Closure properties of Regular languages, Decision Properties of Regular languages, Myhill-Nerode Theorem, Minimization of Finite Automata.

Context Free Grammars and Languages: Context Free Grammars, Derivations, Parse-Trees, Applications of Context Free Grammars, Ambiguity in Grammars and Languages.

UNIT-III

Pushdown Automata: Definitions, The languages of aPDA, Equivalence of PDA's and CFG's, Deterministic Pushdown Automata.

Properties of Context Free Languages: Normal Forms for Context Free Grammars, Pumping Lemma for Context free languages, Closure Properties of CFL's, Deterministic Context free Languages, Decision properties of CFL's.

UNIT-IV

Turing Machines: Introduction, Computational Languages and Functions, Programming Techniques for construction of Turing machines, Modifications of Turing Machine, Turing machine as Enumerator, Restricted Turing machine.

UNIT-V

Undecidability: Recursive and Recursively Enumerable languages, Universal Turing machine and Undecidable problems, Rice Theorem, Post's Correspondence problem. Chomsky's Hierarchy-Regular grammars, Unrestricted grammar, CSL, Relationship between classes of languages.

Suggested Readings:

1. John. E. Hopcroft, Rajeev Motwani, Jeffrey D. Ullman, Introduction to Automata Theory, Languages and Computation, 3rd edition (2009), Pearson Education.
2. John C. Martin, Introduction to Languages and the Theory of Computation, 3rd Edition (2003) Tata McGraw Hill.
3. Michael Sipser, Introduction to Theory of Computation, 3rd Edition (2012), Course Technology