PRASAD V. POTLURI SIDDHARTHA INSTITUTE OF TECHNOLOGY
KANURU, VIJAYAWADA
Department of Computer Science and Engineering

FORMAL LANGUAGES AND AUTOMATA THEORY

SYLLABUS

Course Code	**23CS3503**	**Year**	III	**Semester**	I
Course Category	Professional Core	**Branch**	**CSE**	**Course Type**	PC
Credits	3	**L – T – P**	3-0-0	**Prerequisites**	Discrete Mathematical Structures
Continuous Evaluation	30	**Semester End Evaluation**	70	**Total Marks**	100

Course Outcomes		
Upon successful completion of the course, the student will be able to:		
CO1	Apply concepts of formal languages and automata to solve computational problems.	L3
CO2	Apply finite automata, regular expressions, context-free grammars, and pushdown automata for the design of language recognizers.	L3
CO3	Apply Turing machine techniques to solve problems.	L3
CO4	Analyze automata and their computational power to recognize languages.	L4

Syllabus		
Unit No.	**CONTENTS**	**Mapped CO**
I	**Automata:** Why study Automata Theory?, The central Concepts of Automata Theory. **Finite Automata:** Deterministic Finite Automata, Non-Deterministic Finite Automata, Finite Automata with Epsilon Transitions, Finite Automata with Outputs(without conversions)	CO1, CO2
II	**Regular Expressions and Languages**: Regular Expressions, Finite Automata and Regular Expressions, Algebraic Laws for Regular expressions (without proofs). **Properties of regular Languages:** Proving Languages not to be regular, Closure properties of Regular Languages (without proofs), Equivalence and Minimization of Automata.	CO1, CO2
III	**Context–free grammars and Languages**: Context–free grammars, Parse trees, Ambiguity in grammars and Languages,	CO1, CO2

	Properties of Context-free languages: Normal Forms for Context Free Grammars, The Pumping Lemma For Context Free Languages	
IV	**Pushdown Automata:** Definition of the Pushdown Automaton, The Languages of a PDA, Equivalence of PDA's and CFG's, Deterministic Pushdown Automaton.	CO1,CO2
V	**Turing Machines:** Problems that computer cannot solve, The Turing Machine, Programming Techniques for Turing Machine, Extensions to the Basic Turing Machine **Undecidability:** Recursively Enumerable Language, Universal Turing Machines (UTM), Halting Problem, Post Correspondence Problem, Church Hypothesis.	CO1,CO3, CO4

Learning Resources
Text Books
1. Introduction to Automata Theory, Languages and Computations, J.E.Hopcroft, R.Motwani and J.D Ullman, Third Edition, Pearson Education. 2. Theory of Computer Science, Automata languages and computation, Mishra, Chandra Shekaran, Second Edition, PHI.
Reference Books
1. Introduction of the Theory and Computation, Michael Sipser, 1997, Thomson Brokecole. 2. Elements of The theory of Computation, H.R.Lewis and C.H.Papadimitriou, Second Edition, 2003, Pearson Education/PHI. 3. Formal Languages and Automata Theory, Basavarj S. Anami, Karibasappa K.G, WILEYINDIA. 4. Introduction to Languages and the Theory of Computation, J.C.Martin, Third Edition, TMH, 2003.
e- Resources & other digital material
1.https://www.udemy.com/course/formal-languages-and-automata-theory-e/ 2.https://eecs.wsu.edu/~ananth/CptS317/ 3.https://nptel.ac.in/courses/106/103/106103070/ 4.https://nptel.ac.in/courses/106/106/106106049/ 5.https://nptel.ac.in/courses/111/103/111103016/ 6.https://nptel.ac.in/courses/106/105/106105196/