

**PRASAD V. POTLURI SIDDHARTHA INSTITUTE OF TECHNOLOGY**  
**KANURU, VIJAYAWADA**  
**III B.Tech – I Sem**  
**FORMAL LANGUAGES AND AUTOMATA THEORY**

<b>Offering Branches</b>	CSE, IT	<b>Course Code:</b>	19IT3502
<b>Course Category:</b>	Program Core	<b>Credits:</b>	3
<b>Course Type:</b>	Theory	<b>Lecture-Tutorial- Practical:</b>	3-0-0
<b>Prerequisites:</b>	Discrete Mathematics	<b>Continuous Evaluation:</b>	30
		<b>Semester End Evaluation:</b>	70
		<b>Total Marks:</b>	100

**COURSE OUTCOMES**

Upon successful completion of the course, the student will be able to:

<b>CO1</b>	Understand the fundamental concepts of Formal Languages and Automata.	L2
<b>CO2</b>	Apply the knowledge of Automata Theory, Grammars & Regular Expressions for solving various problems.	L3
<b>CO3</b>	Apply different Turing machines techniques to solve problems.	L3
<b>CO4</b>	Analyze automata and their computational power to recognize languages.	L4

**Course Contents**

<b>UNIT-1</b>	<b>Automata:</b> Why study Automata Theory?, The central Concepts of Automata Theory. <b>Finite Automata:</b> Deterministic Finite Automata, Non-Deterministic Finite Automata, Finite Automata with Epsilon Transitions, Finite Automata with Outputs(without conversions)	CO1, CO2, CO4
<b>UNIT-2</b>	<b>Regular Expressions and Languages:</b> Regular Expressions, Finite Automata and Regular Expressions, Algebraic Laws for Regular expressions (without proofs). <b>Properties of regular Languages:</b> Proving Languages not to be regular, Closure properties of Regular Languages (without proofs), Equivalence and Minimization of Automata.	CO1, CO2
<b>UNIT-3</b>	<b>Context-free grammars and Languages:</b> Context-free grammars, Parse trees, Ambiguity in grammars and Languages, <b>Properties of Context-free languages:</b> Normal Forms for Context Free Grammars, The Pumping Lemma For Context Free Languages	CO1, CO2
<b>UNIT-4</b>	<b>Pushdown Automata:</b> Definition of the Pushdown Automaton, The Languages of aPDA, Equivalence of PDA's and CFG's, Deterministic Pushdown Automaton.	CO1, CO2, CO4
<b>UNIT-5</b>	<b>Turing Machines:</b> Problems that computer cannot solve, The Turing Machine, Programming Techniques for Turing Machine, Extensions to	CO1, CO2, CO3, CO4

	the Basic Turing Machine <b>Undecidability:</b> Recursively Enumerable Language, Universal Turing Machines (UTM), Halting Problem, Post Correspondence Problem, Church Hypothesis.	
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### Learning Resources

#### Text Books

1. Introduction to Automata Theory, Languages and Computations, J.E.Hopcroft, R.Motwani and J.D Ullman, Second Edition, Pearson Education.
2. Introduction of the Theory and Computation, Michael Sipser, 1997, Thomson Brokecole.

#### Reference Books

1. Theory of Computer Science, Automata languages and computation, Mishra, Chandra Shekaran, Second Edition, PHI.
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/>

#### CSE Course Coordinators:

Dr. Lakshmi Ramani B.  
 Mr. Yuva Krishna. Aluri  
 Mr. B. Vinay Kumar

HOD  
(CSE)

#### IT Course Coordinator:

Ms. V Siva Parvathi

HOD  
(IT)

