

## PRASAD V. POTLURI SIDDHARTHA INSTITUTE OF TECHNOLOGY

(Autonomous)

KANURU, VIJAYAWADA-520007

II B. Tech – II Sem CSE (Data Science)

Formal Language of Automata Theory

<b>Course Code</b>	20BS1403	<b>Year</b>	II	<b>Semester</b>	II
<b>Course Category</b>	BSC	<b>Branch</b>	CSE(Data Science)	<b>Course Type</b>	Theory
<b>Credits</b>	3	<b>L-T-P</b>	3-0-0	<b>Prerequisites</b>	Discrete Mathematical Structures
<b>Continuous Internal Evaluation:</b>	30	<b>Semester End Examination:</b>	70	<b>Total Marks:</b>	100

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

<b>Contribution of Course Outcomes towards achievement of Program Outcomes &amp; Strength of correlations (3:Substantial, 2: Moderate, 1:Slight)</b>														
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	P01	P02	P03	P04	P05	P06	P07	P08	P09	P010	P011	P012	PS01	PS02
<b>CO1</b>	2													
<b>CO2</b>	3													
<b>CO3</b>	2													
<b>CO4</b>		2										1		

Syllabus		
Unit No.	Contents	Mapped CO
I	<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
II	<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
III	<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
IV	<b>Pushdown Automata:</b> Definition of the Pushdown Automaton, The Languages of a PDA, Equivalence of PDA's and CFG's, Deterministic Pushdown Automaton.	CO1, CO2, CO4
V	<b>Turing Machines:</b> Problems that computer cannot solve, The Turing Machine, Programming Techniques for Turing Machine, Extensions to the Basic Turing Machine <b>Undecidability:</b> Recursively Enumerable Language, Universal Turing Machines (UTM), Halting Problem, Post Correspondence Problem, Church Hypothesis.	CO1, CO3, CO4

Learning Resources
<b>Text Books</b>
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.
<b>Reference Books</b>
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.
<b>e- Resources &amp; other digital material</b>
1. <a href="https://www.udemy.com/course/formal-languages-and-automata-theory-e/">https://www.udemy.com/course/formal-languages-and-automata-theory-e/</a> 2. <a href="https://eecs.wsu.edu/~ananth/CptS317/">https://eecs.wsu.edu/~ananth/CptS317/</a> 3. <a href="https://nptel.ac.in/courses/106/103/106103070/">https://nptel.ac.in/courses/106/103/106103070/</a> 4. <a href="https://nptel.ac.in/courses/106/106/106106049/">https://nptel.ac.in/courses/106/106/106106049/</a> 5. <a href="https://nptel.ac.in/courses/111/103/111103016/">https://nptel.ac.in/courses/111/103/111103016/</a> 6. <a href="https://nptel.ac.in/courses/106/105/106105196/">https://nptel.ac.in/courses/106/105/106105196/</a>