FORMAL LANGUAGES AND AUTOMATA THEORY

Semester	Subject Code	Category	Lecture Hrs		Theory Hrs		Practical		Credits
			Per week	Per Sem	Per week	Per Sem	Per week	Per Sem	
I	21CPCS1C	CORE III	6	90	6	90	0	0	4

COURSE OBJECTIVE

- This course present the theory of finite automata, as the first step towards learning advanced topics, such as Compiler design. Apply the concepts learned in fundamental courses such as Discrete Mathematics, in a theoretical
- setting; in particular, the application of proof techniques.

COURSE OUTCOME

Successful completion of the course, students will be able to

CO Number	CO Statement	Knowledge Level (K1-K4)
CO1	The ability to prove results using proof by induction, proof by contradiction, proof by construction.	K2
CO2	Ability to describe various automata theoretic models for recognizing formal languages and transform regular expressions and grammars.	K2
CO3	Distinguish different computing languages and classify their respective types.	K3
CO4	Able to construct pushdown automata and the equivalent context free grammars and prove the equivalence of the languages described by pushdown automata and context free grammars.	K4
CO5	Able to design Turing Machine and prove the equivalence of the languages described by Turing machines.	K4

Knowledge Level – K1-Remember, K2- Understand, K3-Apply, K4-Analyze

MAPPING WITH PROGRAMME OUTCOME

COS	PO1	PO2	PO3	PO4	PO5	PO6
CO1	S	S	S	S	S	S
CO2	S	M	S	S	S	M
CO3	S	S	S	M	S	S
CO4	S	S	S	S	S	S
CO5	S	M	S	M	S	M

S-Strong , M-Medium and L-Low

UNIT-I FUNDAMENTALS **18 Hours**

Fundamentals - String, Alphabets, Operations, Finite State Machine – Definitions, Divisibility by Three Tester - Set Theory – Relations – Functions - Counting Techniques – Logic - Methods of Proof.

UNIT–II FINITE AUTOMATA **18 Hours**

Finite Automata –Deterministic and Nondeterministic Finite Automata – Equivalence of NFA and DFA – Finite Automata with Outputs – Finite Automata with Null Moves – Finite Automata and Sequential Circuits.

UNIT - III CLASSIFICATION OF GRAMMERS **19 Hours**

Chomsky classification of grammars -Regular Expression – Relation between Regular languages and Finite Automata- Closure Properties – Automata for Union, Intersection and Difference of Languages – Context free grammars – Normal forms for Context Free Grammar – Parse Trees – Ambiguity Grammars – Removing Ambiguity from Grammars.

UNIT-IV BASIC STRUCTURE OF PDA **17 Hours**

Basic Structure – Types of Acceptance by PDA – Correspondence between PDA and CFL – Parsing and PDA -Languages of PDA – Equivalence of PDA and CFG – Deterministic PDA.

UNIT-V BASIC STRUCTURE OF TM **18 Hours**

Basic structure of TM – Instantaneous Description of Turing Machine – Language of TM – Turing Machine as Computer for Positive Integer- Universal Turing Machine – Turing Machine for 1's Complement, 2's Complement- TM forWell Formed Parenthesis – TM for Unary addition and Multiplication – TM for Palindrome Recognition – TM for GCD – TM for 0^n1^n.

Distribution of Marks: Theory 70% and Problem 30%

TEXTBOOKS

S. NO	AUTHORS	TITLE	PUBLISHERS	YEAR OF PUBLICATION
1	C.K. Nagpal	Formal Languages and Automata Theory	Oxford University Press	2013
2	HopcroftandUllman	Introductionto AutomataTheory,Languagesand Computation	NarosaPublishingHouse,Delhi.	2002
3	E.V. Krishnamurthy	Theory of Computer Science	East West Press Pvt. Ltd.	1985

REFERENCEBOOKS

S. NO	AUTHORS	TITLE	PUBLISHERS	YEAR OF PUBLICATION
1.	JurujHromkovic	Theoretical computer Science	SpringerIndianReprint	2010
2.	John E.Hocroft	Introduction to Automata Theory, Languages and Computation	Paperback	2008
3.	K.V.N. Sunitha	Formal Languages and Automata Theory	Paperback	2015
4	A.A Puntambekar	Formal Languages and Automata Theory for JNTU	Paperback	2015

WEB RESOURCES

1. www.nptel.ac.in
2. https://www.geeksforgeeks.org/theory-of-computation-automata-tutorials/

TEACHING METHODOLOGY

- Class room teaching & Group discussions
- Seminars & Smart Class room
- Chart/Assignment & Simulation Model

SYLLABUS DESIGNERS

- Mrs.G.SANGEETHA LAKSHMI, Assistant professor & HOD, Dept of Computer Science & Applications
- Dr. R HAMSAVENI Assistant Professor , Dept of Computer Science & Applications