



# SWARNANDHRA

## COLLEGE OF ENGINEERING & TECHNOLOGY

(AUTONOMOUS)

Accredited by National Board of Accreditation, AICTE, New Delhi, Accredited by NAAC with "A" Grade – 3.32 CGPA, Recognized under 2(f) & 12(B) of UGC Act 1956  
Approved by AICTE, New Delhi, Permanent Affiliation to JNTUK, Kakinada  
Seetharampuram, W.G.DT., Narsapur-534280, (Andhra Pradesh)

### DEPARTMENT OF INFORMATION TECHNOLOGY

### TEACHING PLAN

Course Code	Course Title	Semester/ Regulation	Branch	Contact Periods /Week	Academic Year	Date of commencement of Semester
20CC4T01	AUTOMATA THEORY AND COMPILER DESIGN	IV / (R20)	CSE-BS	6	2023-2024	03-01-2024
COURSE OBJECTIVES						
1	To learn fundamentals of Regular and Context Free Grammars and Languages					
2	To understand the relation between Regular Language and Finite Automata					
3	To learn how to design Automata machines as Acceptors, Verifiers and Translators					
4	To understand the basic concept of compiler design, and its different phases which will be helpful to Construct new tools like LEX, YACC, etc.					
COURSE OUTCOMES						
1	Illustrate deterministic and non-deterministic finite state machines					
2	Employ finite state machines to solve problems in computing using regular expressions					
3	Demonstrate context free grammars and lexical analyzer of compiler design					
4	Organize Syntax Analysis by Top down and Bottom up Parsing of a compiler design					
5	Analyze synthesized, inherited attributes and syntax directed translation schemes and determine algorithms to generate code for a target machine					
UNIT	Out Comes / Bloom's Level	Topics No.	Topics/ Activity	Text Book/ Reference	Contact Hour	Delivery Method
I	CO – 1	1.1	Need of Automata theory	T1,T2	1	Chalk & Board
		1.2	Central Concepts of Automata Theory	T1,T2	1	
		1.3	Finite Automation	T1,T2	1	Power point presentations
		1.4	Transition(al) Systems, acceptance of a String	T1,T2	1	



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		1.5	DFA, Design of DFAs	T1,R1	1	Assignment  Test
		1.6	NFA, Design of NFA	T1,R1	1	
		1.7	Equivalence of DFA and NFA	T1,R1	1	
		1.8	Conversion of NFA into DFA	T1,R1	1	
		1.9	Finite Automata with C-Transitions	T1,R1	1	
		1.10	Minimization of Finite Automata	T1,R1	1	
		1.11	Finite Automata with output-Transducers	T1,T2	1	
		1.12	Mealy and Moore Machines equivalence and conversions	T1,T2	1	
		1.13	Applications and Limitation of Finite Automata.	T1,T2	1	
Total:					13	
II	CO – 2	2.1	Regular Expressions, Regular Sets, Identity Rules	T1,R2	1	Chalk & Board  Power point presentations  Assignment  Test
		2.2	Manipulations of REs	T1,R2	1	
		2.3	Equivalence between Finite Automata and Regular Expression	T1,R2	1	
		2.4	Inter conversion	T1,R2	1	
		2.5	Closure Properties of Regular Sets, Chomsky Hierarchy Classification of Grammars	T1,R2	1	
		2.6	Right and Left Linear Regular Grammars	T1,R2	1	
Total:					09	
III	CO – 3	3.1	Context Free Grammar	T1,R2	1	Chalk & Board  Power point presentations
		3.2	Leftmost and Rightmost Derivations, Parse Trees, Ambiguous Grammars	T1,R2	1	
		3.3	Simplification of Context Free Grammars- Elimination of Useless Symbols, C-Productions and Unit Productions	T1,R2	1	
		3.4	Chomsky Normal Form of CFG	T1,R2	1	





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		3.5	Greibach Normal Form of CFG	T1,R2	1	Assignment Test
		3.6	Applications of Context Free Grammars	T1,R2	1	
		3.7	Lexical Analysis: Language Processors	T1,R2	1	
		3.8	Structure of a Compiler	T1,R2	1	
		3.9	The Role of the Lexical Analyzer	T1,T2	1	
		3.10	Input Buffering, Specification of Tokens	T1,T2	1	
		3.11	Recognition of Tokens	T1,R2	1	
Total					11	
IV	CO – 4	4.1	Syntax Analysis: The Role of the Parser	T1,R2	1	Chalk & Board  Power point presentations  Assignment Test
		4.2	Left Recursion, Left Factoring	T1,R2	1	
		4.3	Top down Parsing: Pre Processing Steps of Top Down Parsing	T1,R2	1	
		4.4	Backtracking-Brute Force parsing	T1,R2	1	
		4.5	Recursive Descent Parsing	T1,R2	1	
		4.6	Non-recursive Predictive Parsing-LL(0)	T1,R2	1	
		4.7	Error Recovery in Predictive Parsing	T1,R2	1	
		4.8	Bottom Up Parsing: Introduction	T1,R2	1	
		4.9	Difference between LR and LL Parsers	T1,R2	1	
		4.10	Types of LR Parsers, Shift Reduce Parsing	T1,R2	1	
		4.11	SLR Parsers- Construction of SLR Parsing Tables	T1,R2	1	
		4.12	Construction of CLR (1) Parsing Table	T1,R2	1	
		4.13	Construction of LALR Parsing Table	T1,R2	1	
Total					13	
CO-5		5.1	Variants of Syntax Trees	T1,T2	1	Chalk



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	5.2	Intermediate Code Generation: Three Address Code(TAC)	T1,T2	1	<b>&amp; Board</b>  <b>Power point presentations</b>  <b>Assignment</b>  <b>Test</b>
	5.3	Translation of Expressions into TAC	T1,T2	1	
	5.4	Intermediate Code for Procedures	T1,T2	1	
	5.5	Code Optimization: The Principle Sources of Optimization	T1,T2	1	
	5.6	Basic Blocks, Optimization of Basic Blocks	T1,T2	1	
	5.7	Structure Preserving Transformations	T1,T2	1	
	5.8	Flow Graphs, Loop Optimization, Data-Flow Analysis	T1,T2	1	
	5.9	Peephole optimization	T1,T2	1	
	5.10	Code Generation: Issues in the Design of a Code Generator	T1,T2	1	
	5.11	Object Code Forms	T1,T2	1	
	5.12	Code Generation Algorithm	T1,T2	1	
	5.13	Register Allocation and Assignment in code generation	T1,T2	1	
<b>Total</b>				<b>13</b>	
<b>CUMULATIVE PROPOSED PERIODS</b>				<b>58</b>	





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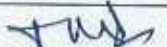
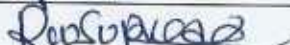
### Text Books:

S.No	AUTHORS, BOOK TITLE, EDITION, PUBLISHER, YEAR OF PUBLICATION
1	J. E. Hopcroft, R. Motwani and J. D. Ullman, Introduction to Automata Theory, Languages and Computation, 3rd Edition, Pearson, 2008
2	K. L. P. Mishra and N. Chandrasekharan, Theory of Computer Science-Automata, Languages and Computation, 3rd Edition, PHI, 2007
3	Alfred V. Aho, Monica S. Lam, Ravi Sethi, Jeffrey D. Ullman, Compilers: Principles, Techniques and Tools, Second Edition, Pearson Publishers, 2007.

### Reference Books:

S.No.	AUTHORS, BOOK TITLE, EDITION, PUBLISHER, YEAR OF PUBLICATION
1	Dasaradh Ramaiah K, Introduction to Automata and Compiler Design, Kindle Edition, PHI, 15 July 2013
2	Lewis H.P. & Papadimitriou C.H., Elements of Theory of Computation, 2 <sup>nd</sup> ed. Pearson / PHI, 2015.
3	V. Kulkarni, Theory of Computation, 3rd Edition, Oxford University Press, 2013.
4	Rajendra Kumar, Theory of Automata, Languages and Computation, 1 <sup>st</sup> edition, McGraw Hill, 2014.
5	Kenneth C Loudon, Compiler Construction, Principles and Practice, Second Edition, Cengage Learning, 2006.
6	Andrew W Appel, Modern compiler implementation in C, Revised edition, Cambridge University Press, 2004.
7	Randy Allen, Ken Kennedy, Morgan Kaufmann, Optimizing Compilers for Modern Architectures, 1st Edition, Elsevier, 2001.
8	Levine, J.R., T. Mason and D. Brown, Lex and Yacc, 2 <sup>nd</sup> edition, O'Reilly & Associates, 1990.

### Web Details:

1		<b>e-Resources:</b> 1) <a href="https://nptel.ac.in/courses/106/104/106104028/">https://nptel.ac.in/courses/106/104/106104028/</a>	
		<b>Name</b>	<b>Signature with Date</b>
i.	Faculty	Mr. M.N.V.L.NARAYANA	
ii.	Module Coordinator	Mr. M.N.V.L.NARAYANA	
iii.	Programme Coordinator	Dr. RVVS Prasad	

  
Principal