THEORY OF COMPUTATION

IV Semester: CSE / I	IT	
Course Code	Category	Hours /

Course Code	Category	H	ours / W	'eek	Credits	Max	kimum N	Marks
AIT002	Foundation	L	Т	Р	С	CIA	SEE	Total
A11002	roundation	3	-	-	3	30	70	100
Contact Classes: 45	Tutorial Classes: Nil	Practical Classes: Nil Total Classes: 4		45				

I. COURSE OVERVIEW:

This course focuses on infinite languages in finite ways, and classifies machines by their power to recognize. It includes finite automata, regular grammar, push down automata, context free grammars, and Turing machines It is applicable in designing phrasing and lexical analysis of a compiler, genetic programming and recursively enumerable languages

II. OBJECTIVES:

The course should enable the students to:

- I The fundamental knowledge of automata theory which is used to solvecomputational problems
- **II** The reorganization of context free language for processing infinite information using push down automata.
- **III** The computer based algorithms with the help of an abstract machine to solverecursively Enumerable problems

III. COURSE OUTCOMES:

After successful completion of the course, students should be able to:

- CO 1 Make use of deterministic finite automata and non deterministic finite automata for Apply modeling lexical analysis and text editors.
- CO 2 Extend regular expressions and regular grammars for parsing and designing Understand programming languages.
- CO 3 **Illustrate** the pumping lemma on regular and context free languages for perform Understand negative test.
- CO 4 **Demonstrate** context free grammars, normal forms for generatingpatterns of strings and Understand minimize the ambiguity in parsing the given strings.
- CO 5 **Construct** push down automata for context free languages for developing parsing Apply phase of a compiler.
- CO 6 Apply Turing machines and Linear bounded automata for recognizing the languages, Apply complex problems.

IV. SYLLABUS:

UNIT-I	FINITE AUTOMATA	Classes: 10	
Fundamentals: Alphabet, strings, language, operations; Introduction to finite automata: The central concepts of automata theory, deterministic finite automata, nondeterministic finite automata, an application of finite automata, finite automata with epsilon transitions.			
UNIT-II	REGULAR LANGUAGES	Classes: 09	

Regular sets, regular expressions, identity rules, constructing finite automata for a given regular expressions, conversion of finite automata to regular expressions, pumping lemma of regular sets, closure properties of regular sets (proofs not required), regular grammars-right linear and left linear grammars, equivalence between regular linear grammar and finite automata, inter conversion.

most and leftmost derivation of strings, applications. Ambiguity in context free grammars, minimization of context free grammars, Chomsky normal form Greibach normal form, pumping lemma for context free languages, enumeration of properties of context Image: the properties of context free grammars, minimization of context free grammars, Chomsky normal form Greibach normal form, pumping lemma for context free languages, enumeration of properties of context Image: the properties of context free grammars, minimization of context free language, enumeration of properties of context Image: the properties of context free language, acceptance by final state at acceptance by empty stack and its equivalence, equivalence of context free language and pushdow automata, inter conversion;(Proofs not required); Introduction to deterministic context free languages at deterministic pushdown automata. Image: the properties of the properis of the properties of the properties of the propertie	Ambiguity in context free grammars, minimization of context free grammars, Chomsky normal form Greibach normal form, pumping lemma for context free languages, enumeration of properties of context free language (proofs omitted). UNIT-IV PUSHDOWN AUTOMATA Classes: 09 Pushdown automata, definition, model, acceptance of context free language, acceptance by final state an acceptance by empty stack and its equivalence, equivalence of context free language and pushdow automata, inter conversion(Proofs not required); Introduction to deterministic context free languages an deterministic pushdown automata. UNIT-V TURING MACHINE Classes: 10 Turing machine: Turing machine, definition, model, design of Turing machine, computable function recursively enumerable languages, Church's hypothesis, counter machine, types of Turing machine (proofs not required), linear bounded automata and context sensitive language, Chomsky hierarchy of languages. Text Book: John E. Hopcroft, Rajeev Motwani, Jeffrey D. Ullman, "Introduction to Automata, Theory, Language and Computation", Pearson Education, 3 rd Edition, 2007. Reference Books: 1 1. John C Martin, "Introduction to Languages and Automata Theory", Tata McGraw-Hill, 3 rd Edition, 2007. 2. Daniel LA. Cohen, "Introduction to Computer Theory", John Wiley & Sons, 2 rd Edition, 2004. Web References: 1. https://www.tutorialspoint.com/automata_theory/index.htm 2. http://infle.ac.in/courses/111103016/ 2. http://inthei.ac.in/courses/110610649/	UNIT-III	CONTEXT FREE GRAMMARS	Classes: 08
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