

## THEORY OF COMPUTATION

<b>IV Semester: CSE / IT / CSIT</b>								
Course Code	Category	Hours / Week			Credits	Maximum Marks		
AITC04	Core	L	T	P	C	CIA	SEE	Total
		3	1	0	4	30	70	100
<b>Contact Classes: 45</b>	<b>Tutorial Classes: 15</b>	<b>Practical Classes: Nil</b>			<b>Total Classes: 60</b>			
<b>Prerequisites: Discrete Mathematical Structures</b>								
<p><b>I. COURSE OVERVIEW:</b>            This course focuses on infinite languages in finite ways, and classify 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.</p> <p><b>II. OBJECTIVES:</b>  <b>The students will try to learn:</b></p> <ol style="list-style-type: none"> <li>I. The fundamental knowledge of automata theory which is used to solve computational problems.</li> <li>II. The reorganization of context free language for processing infinite information using push down automata.</li> <li>III. The computer based algorithms with the help of an abstract machines to solve recursively enumerable problems.</li> </ol> <p><b>III. SYLLABUS:</b></p> <p><b>MODULE –I: FINITE AUTOMATA</b>            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 and without epsilon transitions, Conversion of NFA to DFA, Moore and Melay Machines.</p> <p><b>MODULE –II: REGULAR LANGUAGES</b>            Regular sets, regular expressions, identity rules, constructing finite automata for a given regular expression, 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.</p> <p><b>MODULE –III: CONTEXT FREE GRAMMARS</b>            Context free grammars and languages: Context free grammar, derivation trees, sentential forms, right 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 free language (proofs omitted).</p> <p><b>MODULE –IV: PUSHDOWN AUTOMATA</b>            Pushdown automata, definition, model, acceptance of context free language, acceptance by final state and acceptance by empty stack and its equivalence, equivalence of context free language and pushdown automata, inter conversion;(Proofs not required); Introduction to deterministic context free languages and deterministic pushdown automata.</p> <p><b>MODULE –V: TURING MACHINE</b>            Turing machine: Turing machine, definition, model, design of Turing machine, computable functions, recursively enumerable languages, Church's hypothesis, counter machine, types of Turing machines (proofs not required), linear bounded automata and context sensitive language, Chomsky hierarchy of languages.</p> <p><b>IV.TEXT BOOKS:</b></p> <ol style="list-style-type: none"> <li>1. John E. Hopcroft, Rajeev Motwani, Jeffrey D. Ullman, "Introduction to Automata, Theory, Languages and Computation", Pearson Education, 3<sup>rd</sup> Edition, 2007.</li> </ol>								

**IV. REFERENCE BOOKS:**

1. John C Martin, -Introduction to Languages and Automata Theory|, Tata McGraw-Hill, 3<sup>rd</sup> Edition, 2017.
2. Daniel I.A. Cohen, -Introduction to Computer Theory|, John Wiley & Sons, 2<sup>nd</sup> Edition, 2004.

**V. WEB REFERENCES:**

1. [https://www.tutorialspoint.com/automata\\_theory/index.htm](https://www.tutorialspoint.com/automata_theory/index.htm)
2. <https://www.iitg.ernet.in/dgoswami/Flat-Notes.pdf>