



राष्ट्रीय प्रौद्योगिकी संस्थान रायपुर  
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**Departmental of Computer Science & Engineering**  
**Syllabus**  
**B.Tech. III Semester (Computer Sc. & Engineering)**

1.	Department proposing the course	Computer Science & Engineering
2.	Course Title	Theory of Computation
3.	L-T-P Structure	3-1-0
4.	Credits / # of period	4
5.	Course number(Code)	CCS34
6.	Status (Core/Elective)	Core
7.	Pre-requisites (course no./title)	Discrete Mathematics
8.	Frequency of offer	Once in a Year
9.	Course Objectives(CO) : 1. To introduce concepts in automata theory and theory of computation. 2. To identify different formal language classes and their relationships. 3. To design grammars and recognizers for different formal languages.	
10.	Course Syllabus: <b>Unit-I: The Finite Automata</b> Introduction to automata theory, Examples of Automata, Chomsky hierarchy, Finite Automata (FA) as a language acceptor and translator. Deterministic finite automata, Non deterministic finite automata, finite automata with output (Mealy Machine. Moore machine). Finite automata with Epsilon moves, Conversion of NFA to DFA by Arden's Method, Minimization of DFA. Properties and limitation of FSM. Equivalence of FA, Application of FA.  <b>Unit-II: Regular Expressions</b> Regular expression, Operators & Algebraic Laws of Regular Expression. Conversion of DFA to Regular Expression, Conversion of Regular Expression to DFA. Pumping lemma for Regular sets. Application of pumping lemma, Regular sets and Regular grammar.  <b>Unit-III: Context Free Grammars and Push Down Automata</b> Definition and types of grammar. Chomsky hierarchy of grammar. Relation between types of grammars. Role and application areas of grammars. Context free grammar and Context sensitive grammar. Left most & right most derivation trees. Ambiguity in grammar. Chomsky Normal Form (CNF). Greibach Normal Form (GNF), Pumping lemma from context free language, CYK Algorithm. Basic definitions. Deterministic push down automata and non-deterministic push down automata. Acceptance of push down automata. Push down automata and context free language.	

	<b>Unit-IV: Turing Machine and Computability</b> Turing machine model. Representation of Turing Machine Construction of Turing Machine for simple problem's. Universal Turing machine and other modifications, Un-decidability problem of TM, Halting problem of Turing Machine. Introduction and Basic concepts. Recursive function, Initial functions, computability. Space and time complexity. Church's Hypothesis. Post correspondence problem.
11.	Text Books:- 1. Introduction to Automata theory. Language and Computation -John E. Hopcroft & Jeffery D. Ullman, Narosa Publishing House. 2. Theory of Computer Science (Automata Language & Computation) -K.L.P. Mishra and N. Chandrasekran, PHI. 3. Introduction to Languages and the Theory of Computation. Martin, John C.
12.	Reference Books :- 1. Theory of Automata and Formal Language -R.B. Patel & P. Nath, Umesh Publication. 2. An Introduction and finite automata theory -Adesh K. Pandey, TMH. 3. Theory of Computation -AM Natrajan. Tamilarasi, Bilasubramani, New Age International Publishers.



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