Course Title	**Theory of Computation**	Course No.	**CS222**
Department	Computer Science and Engineering	L-T-P [C]	3-0-0 [3]
Offered for	B. Tech. CSE	Type	Compulsory
Pre-requisite	CS112	To take effect from	July 2015

Objectives	Learning Outcomes
1. To learn about languages, grammars, and computation models 2. To learn about computability 3. To learn about computational complexity	1. To be able to distinguish between computable and un-computable problems 2. To be able to distinguish between tractable and intractable problems

Contents

1. *Finite Automata and Regular Languages:* DFA, NFA, Regular expressions, Equivalence of DFA and NFA, Closure properties of Regular Languages, Regular Pumping lemma, Myhill-Nerode theorem and State minimization
2. *Push-Down Automata and Context Free Languages:* Designing CFGs, Ambiguity, Chomsky Normal Form, Closure properties, CF Pumping Lemma
3. *Computability:* Turing Machines, Church-Turing Thesis, Variants of Turing machines, non-determinism, enumerators, Decidability, Halting problem, Reducibility, Rice's theorem, Undecidability, Godel's incompleteness theorem
4. *Computational Complexity:* The classes P and NP, Boolean circuits, NP Completeness (example problems: SAT)

Reference Books

1. John E. Hopcroft, Rajeev Motwani and Jeffrey D. Ullman, *Introduction to Automata Theory, Languages, and Computation*, Pearson, 2007
2. Michael Sipser, *Introduction to the Theory of Computation*, Cengage Learning, 2013
3. Harry R. Lewis and Christos H. Papadimitriou, Elements of the Theory of Computation , Prentice Hall, 1997
4. Dexter C. Kozen, Theory of Computation, Springer, 2006.