

Course Code	Course Name	Course Type	Cd	L	T	P	Marks		
							Sessional	Final Exam	Total
COM-604	Theory of Computation	PCC	4	3	1	0	50	100	150

Course Outcomes:

At the end of the course the student will be able to:	
CO1	Understand the key notions of computation, such as algorithm, computability, decidability, reducibility, and complexity, through problem solving.
CO2	Understand the models of computation, including formal languages, grammars and automata, and their connections.
CO3	Articulate and explain the Church-Turing thesis and its significance.
CO4	Analyze and design finite automata, pushdown automata, Turing machines, formal languages, and grammars.
CO5	Solve computational problems regarding their computability and complexity and prove the basic results of the theory of computation.

Detailed Syllabus**Section-A**

Unit 1: Finite Automata: Deterministic Finite Automata (DFA), Designing, Non- deterministic finite Automata (NFA) without E-moves, Conversions, Equivalence, NFA with E-moves, Regular expression designing, Finite machine with output assigned, Moore and mealy machines, Conversion and Equivalence, Myhill-Nerode Theorem. **(12 Hrs)**

Unit 2: Regular Grammar & Context free Languages: Context free Grammar, Context free Languages, reduced form of Grammar, Ambiguous and Non- Ambiguous grammar, acceptors and generators, Relations between Classes of Languages, Pumping lemma of regular sets, Chomsky's hierarchy of languages, derivation Trees, CYK Algorithm for CFL Membership, Testing emptiness of CFLs. **(10 Hrs)**

Section-B

Unit 3: Turing Machines: Church Testing Hypothesis, Turing Computability, Non- deterministic, Multitape and other versions of Turing machines, Churches Hypothesis, Primitive Recursive functions, Universal Turing machines, decidability, Halting problem, Stack Automata. **(8 Hrs)**

Unit 4: Push Down Automata: Definition, Model, Acceptance of CFL, Acceptance by Final State and Acceptance by Empty stack and its Equivalence, Equivalence of CFG and PDA. **(6 Hrs)**

Unit 5: Recursive and Recursively Enumerable Languages (rel): Properties of recursive and recursively enumerable languages, Context sensitive language and linear bounded automata (LBA), Chomsky hierarchy, Decidability, Post's correspondence problem (PCKP), undecidability of PCP. **(6 Hrs)**

Text Books

S. No.	Name of the Books	Author	Publisher	Edition (Pub. Yr.)
1	Introduction to Automata Theory, Languages and Computation	J Hopcroft, JD Ullman, R Motwani,	Pearson	3 rd (2008)
2	Elements of the Theory of Computation	Lewis, H.R., Papadimitriou	Pearson	2 nd (2015)

Reference Books

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1	Introduction to Automata Theory, Languages and Computation	John E. Hopcroft and Jeffrey D. Ullman.	Pearson	3 rd (2008)