Program	Bachelor of Technology (BTech)	**Semester - 6**
Type of Course	Professional Core	
Prerequisite	Calculus, Data Structures and Algorithms, Set Theory	
Course Objective	To learn about verious issues in the mathematical devlopement of computer science theory. To gain more formal understanding of various models of computation, their capabilities and limitations.	

Teaching Scheme (Contact Hours)				Examination Scheme				
				Theory Marks		Practical Marks		Total Marks
Lecture	Tutorial	Practical	Credit	SEE (T)	CIA (T)	SEE (P)	CIA (P)	
3	0	0	3	70	30	-	-	100

***SEE** - Semester End Examination, **CIA** - Continuous Internal Assessment (It consists of Assignments/Seminars/Presentations/MCQ Tests, etc.)*

Course Content

T - Teaching Hours | **W** - Weightage

Sr.	Topics	T	W
1	**Review of Mathematical Terms and Theory** Basic mathematical notation and Set theory, Logic, Functions and Relations, Proof, Mathematical induction, Strong principle of mathematical induction, Languages	7	20
2	**Finite Automata** Regular languages & Regular expressions, Finite Automata, Types of Finite Automata, Application of Finite Automata, Extended notation, Union, Intersection and Complement of Regular Languages, Non-Deterministic Finite Automata, Conversion from NFA to FA, ^ - Non-Deterministic Finite Automata, Conversion of NFA-^ to FA, Kleene's Theorem Part – I, Finite Automata with Output, Minimization of FA, Regular and non- regular languages, Pumping lemma	14	20
3	**Context Free Grammar** Types of grammar, Definitions and Examples of CFG, Derivations and Ambiguity , Unambiguous CFG and Algebraic Expressions, Normal Form and Simplified form, Conversion from CFG to CNF	8	20
4	**Pushdown Automata and CFL** Introduction to PDA, Types of PDA, Design of PDA, PDA corresponding to CFG, CFG corresponding to PDA , Unions, Concatenations And Kleene's of Context Free Language, Pumping lemma for CFL	8	20
5	**Turing Machine** TM Definition, Model of Computation, Turing Machine as Language Acceptor, Design of TM, Variations of TM, Universal TM, Church Turing Thesis, Recursive Language & Recursively Enumerable Language, Decidability and Undecidability, Halting problem, Post's Correspondence Problem, Classification of complexity	8	20
	Total	**45**	**100**

Suggested Distribution Of Theory Marks Using Bloom's Taxonomy

Level	Remembrance	Understanding	Application	Analyze	Evaluate	Create
Weightage	15	35	50	0	0	0

NOTE : This specification table shall be treated as a general guideline for the students and the teachers. The actual distribution of marks in the question paper may vary slightly from above table.

Course Outcomes

At the end of this course, students will be able to:	
CO1	**describe** the concept of set theory and mathematical proof techniques.
CO2	**design** finite state machines and equivalent regular expression using concept of language theory.
CO3	**discuss** context free grammar and ambiguity.
CO4	**prepare** pushdown automata and equivalent context free grammars.
CO5	**Implement** recursively enumerable language using turing machines.

Reference Books

1.	**Introduction to languages and the theory of computation Applications** By John C. Martin | Tata McGraw Hill
2.	**Introduction to Theory of Computation** By Michael Sipser | Course Technology
3.	**Automata Theory, Languages and Computation** By John Hopcroft, Rajeev Motwani, Jeffrey Ullman | Pearson Education
4.	**Theory of automata, Languages and computation** By Rajendra Kumar | McGraHill
5.	**The Theory of Computation** By Bernard M. Moret | Pearson Education