Syllabus

Course : USCS301	TOPICS(Credits : 2 Lectures/Week : 3) Theory of Computation	

Objectives :

To provide the comprehensive insight into theory of computation by understanding grammar, languages and other elements of modern language design. Also to develop capabilities to design and develop formulations for computing models and identify its applications in diverse areas.

Expected Learning Outcomes :

1. Understand Grammar and Languages.
2. Learn about Automata theory and its application in Language Design.
3. Learn about Turing Machines and Pushdown Automata.
4. Understand Linear Bound Automata and its applications.

Unit	Details	Lectures
I	**Automata Theory :** Defining Automaton, Finite Automaton, Transitions and Its properties, Acceptability by Finite Automaton, Nondeterministic Finite State Machines, DFA and NDFA equivalence, Mealy and Moore Machines, Minimizing Automata. **Formal Languages :** Defining Grammar, Derivations, Languages generated by Grammar, Chomsky Classification of Grammar and Languages, Recursive Enumerable Sets, Operations on Languages, Languages and Automata. **(Refer Chapters 1 and 2)**	15
II	**Regular Sets and Regular Grammar :** Regular Grammar, Regular Expressions, Finite automata and Regular Expressions, Pumping Lemma and its Applications, Closure Properties, Regular Sets and Regular Grammar **Context Free Languages :** Context-free Languages, Derivation Tree, Ambiguity of Grammar, CFG simplification, Normal Forms, Pumping Lemma for CFG **Pushdown Automata:** Definitions, Acceptance by PDA, PDA and CFG.s **(Refer Chapters 3, 4 and 5)**	15
III	**Linear Bound Automata :** The Linear Bound Automata Model, Linear Bound Automata and Languages. **Turing Machines :** Turing Machine Definition, Representations, Acceptability by Turing Machines, Designing and Description of Turing Machines, Turing Machine Construction, Variants of Turing Machine. **Undecidability :** The Church-Turing thesis, Universal Turing Machine, Halting Problem, Introduction to Unsolvable Problems. **(Refer Chapters 5 and 6)**	15

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Unit I