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| **Paper Code: HCSCR5121T** | **Theory of Computation**  **(Theory)** | **Marks: 100** |
| **Week** | **Topic** | **No. of Periods** |
| **Group A (30 periods)** | | |
| 1 | **Introduction to Theory of Automata**  Mathematical Preliminaries and notation, Basic concepts of Languages, Grammars and Automata, Some Applications | 2 |
| 1 | **Languages**  Alphabets, string, language, Basic Operations on language, Concatenation, Kleene’s Star, Kleene’s theorem. | 8 |
| 2 | **Finite Automata and Regular Languages**  Regular Expressions, Transition Graphs, Deterministic Finite automata(DFA)and non-deterministic finite automata(NDFA), NFA to DFA Conversion, Regular languages and their relationship with finite automata, Pumping lemma and closure properties of regular languages. | 20 |
| **Group B (35 Periods)** | | |
| 1 | **Context free languages**  Context free grammars, parse trees, ambiguities in grammars and languages, Pushdown automata (Deterministic and Non-deterministic), Pumping Lemma, Properties of context free languages, Chomsky Normal Form(CNF), Greibach Normal Form(GNF). | 16 |
| 2 | **Turing Macines and Models of Computations**  Turing Machine as a model of computation, Designing Turing machine (i) To add two positive integers, (ii) To subtract one integer from another integer, (iii) To take product of 2 integers, Non deterministic Turing machine, halting problem. | 11 |
| 3 | **Computability Theory**  Chomsky hierarchy of languages, linear bounded automata and context sensitive language, Universal Turing Machine. | 8 |
| **Total** | | **65** |
| **Books and References:**  1. Daniel I.A.Cohen, Introduction to computer theory, John Wiley,1996  2. Lewis & Papadimitriou, Elements of the theory of computation , PHI 1997.  3. Hopcroft, Aho, Ullman, Introduction to Automata theory, Language & Computation –3rd Edition, Pearson Education. 2006  4. P. Linz, An Introduction to Formal Language and Automata 4th edition Publication Jones Bartlett, 2006  5.Theory of Computer Science – Automata languages and computation -Mishra and Chandrashekaran, 2nd edition, PHI. | | |