Programme: B.C.A   **Semester: III**

THEORY OF COMPUTATION

Course Code: 18BCAIIIT1   **No. of Hours: 60**

COURSE OBJECTIVES:

- To learn about fundamental concepts of finite automata and formal language
- To enhance student's ability to understand and solve mathematical proofs for computation and algorithm
- To learn about deterministic and non- deterministic machines.
- To design grammars and recognizers for different formal languages

LEARNING OUTCOMES:

- Students will have clear understanding of abstract models of computation.
- Students will be able to analyses and design the finite automata, pushdown automata, formal language and language.
- Students will be able to apply mathematical and formal techniques for solving problems in computer science.

UNIT – I   **13 HRS**
Introduction to Finite Automata: The central concepts of Automata theory; Deterministic finite automata; Nondeterministic finite automata. Applications of finite automata, Finite automata with Epsilon transitions.

UNIT - II   **13 HRS**
Finite Automata and Regular Expressions: Applications of Regular Expressions; Regular languages; Proving languages not to be regular languages; Closure properties of regular languages; Decision properties of regular languages; Equivalence and minimization of automata.

UNIT - III   **13 HRS**
Context–free grammars: Parse trees; Applications; Ambiguity in grammars and Languages. Definition of the Pushdown automata; the languages of a PDA; Equivalence of PDA's and CFG's.

UNIT – IV   **12 HRS**
Deterministic Pushdown Automata: Normal forms for CFGs; The pumping lemma for CFGs; Closure properties of CFLs.

UNIT – V   **09 HRS**
The Turing machine: Programming techniques for Turing Machines, Extensions to the basics Turning machines, Turning machines and computers.

REFERENCES:

1. John E. Hopcroft, Rajeev Motwani, Jeffrey D.Ullman: <u>Introduction to Automata Theory, Languages and Computation</u>, 3rd Edition, Pearson Education, 2011.
2. John C Martin: <u>Introduction to Languages and Automata Theory</u>, 3rd Edition, Tata McGraw-Hill, 2007.
3. Daniel I.A. Cohen: <u>Introduction to Computer Theory</u>, 2nd Edition, John Wiley & Sons, 2009.
4. Thomas A. Sudkamp: An <u>Introduction to the Theory of Computer Science, Languages and Machines</u>, 3rd Edition,Pearson Education, 2006.