3MCACC2: FINITE AUTOMATA AND FORMAL LANGUAGES

Total No. of Hours: 52 **Hours/Week: 04**

Course Objective: Insight to theory of computation and formal languages for aspiring systems level programming.

Course Outcome: Students will be able to

CO1: Learn the fundamentals of finite state machines

CO2: Design deterministic finite state automaton using NFA, RE, CFG

CO3: Learn the importance of applications in areas of automated systems

Unit I	**Introduction** - Strings, Alphabets and Languages, Deterministic Finite Automaton (DFA), Non Deterministic Automaton (NFA). Equivalence of NFA and DFA without proof, Automaton with Є-moves, DFA design techniques, Moore and Mealy machines, conversion from NFA to DFA, Application of DFA.	10 hrs
Unit II	**Regular expressions** - Є-NFA from RE – Kleen's theorem, RE from FA, elimination states method, Applications of RE, Regular languages, properties of regular languages, Pumping lemma, Minimization of FA, Table fill algorithm	10 hrs
Unit III	**Context Free grammar and Languages**-Definition of grammar, Chomsky Hierarchy, grammar from FA, Grammar from RE, Derivation, Derivation tree, ambiguous grammar, Application of CFG	12 hrs
Unit IV	**Pushdown Automata** – Transitions, Graphical representation of PDA, language accepted by PDA, Construction of PDA, Deterministic and non-deterministic PDA, CFG to PDA, Application of GNF, PDA to CFG, Chomsky Normal Form, Properties of CFL's	10 hrs
Unit V	**Turing machines**- Model, transition table, Acceptance of a language by TM, Construction of TM, counter machines, off line TM, Undecidability - Language not recursively enumerable, halting problem	10 hrs

REFERENCE BOOKS

[1] John E Hopcroft and Jeffrey D Ullman, "*Introduction to Automata Theory*", Addison-Wesley, Third Edition.

[2] Gyorgy E Revesz, "*Introduction to Formal Languages*", Jones and Bartlett Publishers, Fourth Edition.

[3] Dick Grune, Henri E Bal, Ceriel J. H. Jacobs, Kone G. Langendoen, "*Modern Compiler Design"*, Wiley dreamtech India Pvt. Ltd., Edition 2003.

[4] Derick Wood, "*Theory of Computation*",Longman Higher Education.

[5] Daniel Cohen, "*Theory of Computation*", ISBN Publications.

[6] Jon Duckett, "*Beginning HTML, XHTML, CSS, and JavaScript*", Wiley Publishing,2010