CS-404: THEORY OF COMPUTATION

Teaching Scheme			Credits	Marks			Duration End Semester Examination
L	T	P/D	C	Sessional	End Semester Exam	Total	
3	1	0	4	40	60	100	3 hrs

COURSE CONTENT:

UNIT	CONTENT	No. of Hrs.
I	**Fundamentals:** Automata Definition, applications, finite state machine, definitions, finite automaton model, acceptance of strings, deterministic finite automaton and non deterministic finite automaton, transition diagrams. **Finite Automata**: NFA with Λ-transitions, significance, equivalence of NFA & DFA, equivalence between NFA with and without Λ-transitions, minimization of FSM, equivalence between two FSMs, finite automata with output- Moore and Melay machines.	10
II	**Regular Languages:** Regular sets, regular expressions, identity rules, constructing finite automata for a given regular expressions, Arden's theorem, conversion of finite automata to regular expressions, pumping lemma of regular sets, closure properties of regular sets (proofs not required), Myhill-Nerode theorem and minimization of finite automata, minimization algorithm.	10
III	**Grammar Formalism:** Regular grammars-right linear and left linear grammars, equivalence between regular linear grammar and FA, inter conversion, context free grammar, derivation trees, sentential forms, right most and leftmost derivation of strings. **Context Free Grammars:** Ambiguity in context free grammars, minimization of context free grammars, Chomsky normal form, Greibach normal form. **Push Down Automata**: Push down automata, definition, model, acceptance of CFL, acceptance by final state and acceptance by empty state and its equivalence, applications of push down machines.	10
IV	**Turing Machine**: Turing Machine, definition, model, design of TM, types of turing machines (proofs not required), post correspondence problems and halting problem of turing machine. **Chomsky Hierarchies:** Chomsky hierarchies of grammars, unrestricted grammars, context sensitive languages, relation between languages of classes.	9

	Computability: Basic concepts, primitive recursive functions.	

Text Books:

1. Hopcroft H. E. and Ullman J. D., ***"Introduction to Automata Theory Languages and Computation"***, Pearson Education.
2. Sipser, ***"Introduction to Theory of Computation"*** Thomson.

Reference Books:

1. Daniel I.A. Cohen, ***"Introduction to Computer Theory"***, John Wiley
2. John C Martin, ***"Introduction to languages and the Theory of Computation"***, TMH
3. Lewis H.P. and Papadimition C.H., ***"Elements of Theory of Computation"***, Pearson /PHI
4. Mishra and Chandrashekaran, ***"Theory of Computer Science, Automata Languages and Computation"***, PHI