BEIT403T **THEORY OF COMPUTATION**
(Theory Credit: 05)

Teaching Scheme: **Examination Scheme:**
Lecture: 4 Hours/week Theory: T (U): 80 Marks T (I): 20 Marks
Tutorial: 1 Hour/week Duration of University Exam. : 03 Hours
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UNIT I:
Strings, Alphabet, Language operations, Finite state machine definitions, Finite automation model, Acceptance of strings and language, Non deterministic finite automation, Deterministic finite automation, Equivalence between NFA and DFA, Conversion of NFA into DFA, Minimization of FSM, Equivalence between two FSM's Moore and Mealy machines

UNIT II:
Regular sets, Regular expressions, Identity rules, Manipulation rules, Manipulation of regular expressions, Equivalence between RE and FA, Inter conversion, Pumping lemma, Closure properties of regular sets(proofs not required), Chomsky hierarchy of languages, Regular grammars, Right linear and left linear grammars, Equivalence between regular linear programming and FA, Inter conversion between RE and RG.

UNIT III:
Context free grammar, Derivation trees, Chomsky normal form, Greibach normal form, Push down automata, Definition, Model acceptance of CFL, Equivalence of CFL and PDA, Inter conversion, Closure properties of CFL(Proofs omitted),Pumping Lemma of CFL, Introduction of DCFL and DPDA

UNIT IV:
Turing Machine: Definition, Model of TM, Design of TM, Universal Turing Machine, Computable function, Recursive enumerable language, Types of TM's (proofs not required), Linear bounded automata and Context sensitive language, Counter machine

UNIT V:
Decidability and Undecidability of problems, Properties of recursive & recursively enumerable languages, Halting problems, Post correspondence problem, Ackerman function, and Church's hypothesis.

UNIT VI:
Recursive Function: Basic functions and operations on them, Bounded Minimalization, Primitive recursive function, µ-recursive function, Primitive recursive predicates, Mod and Div functions, Unbounded Minimalization, Equivalence of Turing Computable function and µ-recursive function.

Text Books:
   1. Introduction to Automata Theory, Languages and Computation by J. E. Hopcraft,R. Motwani, J. D Ullman, second Edition, Pearson Education, Aisa
   2. An Introduction to Formal Languages and Automata by Peter Linz

   3. Introduction to Langauges and the theory of Automata by John Martin, Third Edition(TMH)
Reference Books:
   1. Theory of Computer Science, Automata, Languages and Computation by K. L. P. Mishra and N. Chandrasekaran, Third Edition, PHI Learning.
   2. Elements of Theory of Computation by Lewis H.P and Papadimition C.H.

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