Gujarat Technological University

B.E. – Computer Engineering (Semester – VI)

2160704 – Theory of Computation

SYLLABUS

Teaching Scheme			Credits	Examination Marks				Total Marks
				Theory Marks		Practical Marks		
L	T	P	C	ESE (E)	PA (M)	ESE (V)	PA (I)	
3	0	0	3	70	30	0	0	100

PREREQUISITE: Calculus, Data Structures and Algorithms

RATIONALE: Theory of computation teaches how efficiently problems can be solved on a model of computation, using an algorithm. It is also necessary to learn the ways in which computer can be made to think. Finite state machines can help in natural language processing which is an emerging area.

TERM DURATION: 12/12/2019 TO 14/04/2010 (17 WEEKS)

#	Description	#Lect	Wetg
1	**Review of Mathematical Theory:** Sets, Functions, Logical statements, Proofs, relations, languages, Mathematical induction, strong principle, Recursive definitions	10	16
2	**Regular Languages and Finite Automata:** Regular expressions, regular languages, applications, Automata with output-Moore machine, Mealy machine, Finite automata, memory requirement in a recognizer, definition, union, intersection and complement of regular languages.Non Determinism Finite Automata, Conversion from NFA to FA, $\in$ - Non Determinism Finite Automata Conversion of NFA- $\in$ to NFA and equivalence of three Kleene's Theorem, Minimization of Finite automata Regular And Non Regular Languages – pumping lemma.	12	20

3	**Context free grammar (CFG):** Definition, Unions Concatenations And Kleen's of Context free language Regular grammar, Derivations and Languages, Relationship between derivation and derivation trees, Ambiguity Unambiguous CFG and Algebraic Expressions BacosNaur Form (BNF), Normal Form – CNF	12	20
4	**Pushdown Automata, CFL And NCFL:** Definition, deterministic PDA, Equivalence of CFG and PDA, Pumping lemma for CFL, Intersections and Complements of CFL, Non-CFL	12	20
5	**Turing Machine (TM):** TM Definition, Model Of Computation And Church Turning Thesis, computing functions with TM, Combining TM, Variations Of TM, Non Deterministic TM, Universal TM, Recursively and Enumerable Languages, Context sensitive languages and Chomsky hierarchy	12	20
6	**Computable Functions:** Partial, total, constant functions, Primitive Recursive Functions, Bounded Mineralization, Regular function, Recursive Functions	2	4

Course Outcome:

#	CO Statement
CO1	Students will apply this basic knowledge of Theory of Computation in the computer field to solve computational problems and in the field of compiler also.
CO2	At the end of the course the students will be able to understand the basic concepts and application of Theory of Computation.