GUJARAT TECHNOLOGICAL UNIVERSITY
Syllabus for Integrated MSc, 5th Semester
Branch: Computer Science
Subject Name: Theory of Computation
Subject Code: 1350305

Teaching and Examination Scheme:

Teaching Scheme			Credits	Examination Marks				Total Marks
				Theory Marks		Practical Marks		
L	T	P	C	ESE(E)	PA (M)	PA (I)	ESE (V)	
4	1	0	5	70	30	0	0	100

Content:

Sr. No.	Content	Teaching Hours	Module Weightage (%)
1.	**Finite Automata and Regular Language:** Types of FA, Application of FA, Automata with output - Moore machine & Mealy machine, DFA, NFA,, Conversion from NFA to FA, - Non Deterministic Finite Automata, Conversion of epsilon NFA to DFA, Minimization of Finite automata, Regular And Non Regular Languages, Regular Expressions, Pumping lemma	16	25%
2.	**Context free grammar (CFG):** Definitions and Examples, Unions Concatenations And Kleene's of Context free language, Derivations and Ambiguity , Unambiguous CFG and Algebraic Expressions, Chomsky Normal Form, Backus Naur Form (BNF),GNF	08	20%
3.	**Pushdown Automata, CFL And NCFL:** Definitions, Deterministic PDA, Equivalence of CFG and PDA & Conversion, Pumping lemma for CFL, Intersections and Complements of CFL, Non-CFL.	08	20%
4.	**Turing Machine (TM):** TM Definition, Model Of Computation, Turing Machine as Language Acceptor, TM that Compute Partial Function, Church Turning Thesis, Combining TM, Variations Of TM, Universal TM.	10	20%
5.	**Undecidability :** A Language That Can't Be Accepted, and a Problem That Can't Be Decided , Non Recursive Enumerable (RE) Language – Undecidable Problem with RE – Undecidable Problems about TM – Undecidable Problems Involving Context-Free Languages, Post's Correspondence Problem	06	15%

Reference Books:

1. Introduction to Languages and the Theory of Computation, 4th by John Martin, Tata Mc Graw Hill
2. Introduction to computer theory By Deniel I. Cohen , Joh Wiley & Sons, Inc
3. Introduction to the Theory of Computation By Michael Sipser

4. Automata Theory, Languages, and Computation By John Hopcroft, Rajeev Motowani, and Jeffrey Ullman

Course Outcomes:

Sr. No.	CO Statement
CO-1	Demonstrate knowledge of basic mathematical models of computation and describe how they relate to formal languages
CO-2	Build finite automata, push down automata and turing machine.
CO-3	Build Regular Expressions
CO-4	Classify and construct grammars for different languages
CO-5	Understand the limitations on what computers can do, and learn examples of unsolvable Problems