Course Code: CSE2018	**Course Title:** Theory of Computation **Type of Course:** Program Core & Theory only	**L- T- P-C**	3	0	0	3
Version No.	2.1					
Course Pre-requisites	MAT 2004 - Discrete Mathematical Structures					
Anti-requisites	**NIL**					
Course Description	The purpose of Theory of Computation Course is to enable the students to appreciate the study of formal language and the correspondence between language classes and the automata that is recognized. Analytical ability is required for the students to analyze and develop automata. The course is both conceptual and analytical in nature. It imposes fair knowledge of Mathematical and computing fundamentals. The course develops the critical thinking and analytical skills. The simulation using JFLAP makes the student to visualize the automata construction and string parsing. The assignment work given based on simulation helps the students to build any context free grammar and Turing Machine for the Language.					
Course Objectives	The objective of the course is to familiarize the learners with the concepts of Computational, language models and attain employability through Participative Learning techniques.					
Course Outcomes	**On successful completion of the course the students shall be able to:** **CO1:** Discuss the basic concepts of Automata theory and its applications. **[Understand]** **CO2:** Construct different types of Finite Automata with its simulation. **[Apply]** **CO3:** Develop the Simplified Grammars in CNF and GNF forms. **[Apply]** **CO4:** Solve the Push Down Automata and Turing machine problems for a given language. **[Apply]**					
Course Content:						
Module 1	Introduction to Automata Theory	Assignment	Problem Solving	**06 Sessions**		
Topics: Introduction to Automata Theory, Basic definitions: Languages, grammar and automata, Representation of automata, Language recognizers, Applications of Automata Theory.						
Module 2	Finite Automata	Assignment	Problem Solving	**14 Sessions**		
Topics: Basic concepts of Finite automata, DFA -Definitions of DFA, Deterministic Accepters Transition Graphs , Languages and DFA's, Regular Languages, NFA- Definition of a Non deterministic Accepter, Languages and NFA's, Equivalence of Deterministic and Nondeterministic Finite Accepters, Reduction of the Number of States in Finite Automata, ε-NFA - Definition of ε-NFA, Conversion of ε-NFA to DFA.						

Module 3	Regular Expressions & Context Free Grammar	Assignment	Problem Solving	**14 Sessions**
Topics: Formal Definition of a Regular Expression, Connection between Regular Expressions and Regular Languages: Regular Expressions denote Regular Languages; Pumping Lemma for regular languages, Context Free Grammars-Examples of Context-Free Languages, Left most and Right most Derivations, Derivation Trees, Ambiguity in Grammars, Pumping lemma for CFL, Grammar Simplification, CNF and GNF.				
Module 4	Push down Automata and Turing Machine	Assignment	Problem Solving	**12 Sessions**
Topics: Definition of a Pushdown Automaton, Language Accepted by a Pushdown Automaton, Pushdown Automata for Context-Free Languages, Deterministic Pushdown Automata, Definition of a Turing Machine, Turing Machines as Language Accepters. **Assignment: Solve Different FA Design Techniques to solve various problems to construct FA (any 3 may be included)**				
Targeted Application: **Application Area is to Design and Analyzing the efficiency of compilers. This fundamental course is used by all application developers.**				
Project work/Assignment:				
Problem Solving: Design different FA Design techniques, Regular Expressions				
Text Book: 1. Peter Linz, "An introduction to Formal Languages and Automata", 6th Edition, Jones and Bartlett Publications, 2018.				
References 1. Aho, Ullman and Hopcroft, "Theory of Computation", 3rd Edition, Pearson India, 2008 2. Michael Sipser, "Theory of Computation", 3rd Edition, Cengage India, 2014 3. NPTEL Link-https://onlinecourses.nptel.ac.in/noc21_cs83/preview 4. JFLAP simulator - https://www.jflap.org/jflaptmp/				
Catalogue prepared by	Mr. Jinesh V.N.			
Recommended by the Board of Studies on	(BOS NO: 15 th. BOS held on 26 / 03 /2022)			
Date of Approval by the Academic Council	(Academic Council Meeting No. , Dated / /)			