LOK JAGRUTI UNIVERSITY (LJU)

INSTITUTE OF ENGINEERING & TECHNOLOGY

Department of Computer science & Design (703)

Bachelor of Technology (B.E.) – Semester - IV

Course Code:	**017033494**
Course Name:	**Theory of Computation**
Category of Course:	Professional Core Course (PCC)
Prerequisite Course:	Data Structure (017033292), Discrete Mathematics (017033491)

Teaching Scheme				
Lecture (L)	**Tutorial (T)**	**Practical (P)**	**Credit**	**Total Hours**
3	**2**	**0**	**5**	**50**

Syllabus

Unit No.	Topic	Prerequisite Topic	Successive Topic	Teaching Hours
01	**Introduction**			**3 (2%)**
	1.1 Introduction to Alphabet, string, Language	Set Theory (017033491- Unit 1.1,1.3)	----	
	1.2 Basics of Automata			
02	**Regular Expressions and Languages**			**4 (9%)**
	2.1 Understanding Regular Expression, Regular Languages	Introduction (017033494 - Unit-1)	Lexical Analyzer (017033592-Unit-2.3,2.4)	
	2.2 Closure properties of Regular Languages	----		
03	**Finite Automata 1**			**4 (5%)**
	3.1 Deterministic Finite Automata (DFA)	Regular Expressions and Languages (017033494 - Unit-2.1)	----	
	3.2 Non - Deterministic Finite Automata (NFA)		----	
	3.3 Finite Automata with Epsilon Transition (NFA - ^)		----	
	3.4 Application of Finite Automata		----	
04	**Finite Automata 2**			**5 (11%)**
	4.1 RE to FA conversion	----	Lexical Analyzer (017033592-Unit-2.3,2.4)	
	4.2 FA to RE Conversion			
	4.3 Minimization of Finite Automata		----	
05	**Deterministic Finite Automata & Non - Deterministic Finite Automata**			**6 (12%)**
	5.1 Conversion from Finite Automata with Epsilon Transition (NFA - ^) to Non - Deterministic Finite Automata (NFA)	Finite Automata 1 (017033494 - Unit-3)	----	
	5.2 Conversion from Non - Deterministic Finite Automata (NFA) to Deterministic Finite Automata (DFA)		----	
	5.3 Conversion from Finite Automata with Epsilon Transition (NFA - ^) to Deterministic Finite Automata (DFA)		----	
06	**Operations on Finite Automata**			**5 (11%)**
	6.1 Union, Intersection, Difference of a FA	Finite Automata 1 (017033494 - Unit-3.1)	----	
	6.2 Pumping lemma	----	----	
	6.3 Kleen’s Theorem	----	----	
07	**Context Free Grammar and Languages**			**7 (17%)**
	7.1 Context Free Grammar and Context Free Languages with example, RE to CFG, CFG to RE	Finite Automata 1 (017033494 - Unit-3)	Syntax Analysis (017033592-Unit-3)	
	7.2 Derivation Tree and Ambiguity	----		
	7.3 Regular Grammar-CNF, Pumping Lemma	----	----	
08	**Push down Automata**			**6 (13%)**
	8.1 Introduction to PDA, DPDA and NPDA	Finite Automata 1 (017033494 - Unit-3)	----	
	8.2 Design a PDA, CFG to PDA, PDA to CFG		----	
	8.3 Pumping Lemma	----	----	
09	**Turing Machine**			**6 (13%)**
	9.1 Definition of TM	Finite Automata 1 (017033494 - Unit-3)	----	
	9.2 Designing of TM, TM Variants		----	
10	**Recursively Enumerable Languages**			**4 (7%)**
	10.1 Definition of Recursively Enumerable Languages and Recursive Languages	Turing Machine(017033494 - Unit-9), Stack-1 (017033292 - Unit-2.2)	----	
	10.2 Examples of REL		----	
	10.3 Closure Properties	----	----	

Proposed Theory + Practical Evaluation Scheme by Academicians (% Weightage Category Wise and it's Marks Distribution)					
L :	**3**	**T:**	**2**	**P:**	**0**
Note : In Theory Group, Total 4 Test (T1+T2+T3+T4) will be conducted for each subject. Each Test will be of 25 Marks. Each Test Syllabus Weightage: Range should be 20% - 30%					
Group (Theory or Practical)	**Group (Theory or Practical) Credit**	**Total Subject Credit**	**Category**	**% Weightage**	**Marks Weightage**
Theory	**5**	**5**	MCQ	30%	30
Theory			Theory Descriptive	0%	0
Theory			Formulas and Derivation	0%	0
Theory			Numerical	70%	70
Expected Theory %	**100%**		**Calculated Theory %**	**100%**	**100**
Practical	**0**		Individual Project	0%	0
Practical			Group Project	0%	0
Practical			Internal Practical Evaluation (IPE)	0%	0
Practical			Viva	0%	0
Practical			Seminar	0%	0
Expected Practical %	**0%**		**Calculated Practical %**	**0%**	**0**
Overall %	**100%**			**100%**	**100**

Course Outcome	
1	Identify different formal languages into expressions for regular languages and concept of finite automata.
2	Design and build Finite Automata and translate between different models of computation.
3	Construct context free grammar for context free languages and design of Push down Automata.
4	Build turing manchine and analyze concepts for recursively enumerable languages.
Suggested Reference Books	
1	Introduction to Languages and Theory of Computation, John C. Martin, TMH
2	Introduction to the Theory of Computation, Michael Sipser, 3rd edition, Cengage Learning
3	Introduction to computer theory, Deniel I. Cohen, John Wiley & Sons In
4	An introduction to automata theory and formal languages, Adesh K. Pandey, S. K. Kataria & Sons

List of Open Source Software/Learning website	
1	https://nptel.ac.in/courses/106/103/106103070/
2	https://nptel.ac.in/courses/106/104/106104148/
3	https://nptel.ac.in/courses/111/103/111103016/