

LOK JAGRUTI UNIVERSITY (LJU)
INSTITUTE OF ENGINEERING & TECHNOLOGY

Department of Computer Engineering (701)
Bachelor of Technology (B.E.) – Semester - IV

Course Code:	017013494
Course Name:	Theory of Computation
Category of Course:	Professional Core Course (PCC)
Prerequisite Course:	Data Structure (017013292), Discrete Mathematics (017013491)

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 (017013491- 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 (017013494 - Unit-1)	Lexical Analyzer (017013592-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 (017013494 - 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 (017013592-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 (017013494 - 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 (017013494 - 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 (017013494 - Unit-3)	Syntax Analysis (017013592-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 (017013494 - 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 (017013494 - 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(017013494 - Unit-9), Stack-1 (017013292 - 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 machine 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/