Course Title : Theory of Computation			
Course Code : P18CS42	**Semester : 4**	**L :T:P:H : 4:0:0:4**	**Credits: 3**
Contact Period: Lecture: 52 Hrs, Exam: 3 Hrs		**Weightage: CIE:50%, SEE:50%**	

Course Content

Unit-1

Introduction to Finite Automata: Introduction to Finite Automata; The central concepts of Automata theory; Deterministic finite automata; Nondeterministic finite automata. Application of finite automata; Finite automata with Epsilon transitions; Equivalence and minimization of automata.

Self Study Components: Extended transitions and languages for E-NFA

10 Hours

Unit-2

Regular Expression,Regular Languages, Properties of Regular Languages: Regular expressions; Finite Automata and Regular Expressions; Applications of Regular Expressions. Regular languages; Proving languages not to be regular languages; Closure properties of regular languages; Decision properties of regular languages.

Self Study Components: Applications of Regular expressions

10 Hours

Unit-3

Context-Free Grammars And properties of Context-Free Languages : Context –free grammars; Parse trees; Applications; Ambiguity in grammars and Language**s,** Definitions of Normal forms for CFGs; The pumping lemma for CFGs; Closure properties of CFLs.

Self Study Components: Removing ambiguity in grammars, normal forms for CFG

10 Hours

Unit-4

Pushdown Automata: Definition of the Pushdown automata; the languages of a PDA; Equivalence of PDA's and CFG's; Deterministic Pushdown Automata.

Self Study Components: CFG to PDA, PDA to CFG

12 Hours

Unit-5

Introduction to Turing Machine, Undecidability: Problems that Computers cannot solve; The turning machine; Programming techniques for Turning Machines; Extensions to the basic Turning Machines; Turing Machine and Computers. Undecidable problem that is RE; Post's Correspondence problem.

Self Study Components: Tuning machine and computers

10 Hours

Text Book :

1. John E.. Hopcroft, Rajeev Motwani, Jeffrey D.Ullman: Introduction to Automata Theory, Languages and Computation, 3rd Edition, Pearson education, 2014.

Reference Books:

1. Raymond Greenlaw, H.James Hoover: Fundamentals of the Theory of Computation, Principles and Practice, Morgan Kaufmann, 1998.
2. John C Martin: Introduction to Languages and Automata Theory, 3rd Edition, Tata McGraw Hill, 2007.
3. Daniel I.A. Cohen: Introduction to Computer Theory, 2nd Edition, John Wiley & Sons, 2004.

4. Thomas A. Sudkamp: An Introduction to the Theory of Computer Science, Languages and Machines, 3rd Edition, Pearson Education, 2006

Course Outcomes:

After learning all the units of the course, the student is able to

1. Design finite automata
2. Apply regular expression for lexical analysis phases
3. Design grammars for various languages
4. Design push-down automata from grammars and grammar to pda
5. Design Turing machines for simple languages and design problem reductions to determine the undecidability of languages

CO-PO Mapping

Semester: 4	Course code : P18CS42	Title : Theory of Computation													
CO	**Statement**	**PO 1**	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PS O1**	**PS O2**
CO-1	Design finite automata	2	3	-	-	-	-	-	-	-	-	-	-	3	-
CO-2	Apply regular expression for lexical analysis phases	2	2	3	-	-	-	-	-	-	-	-	-	3	
CO-3	Design grammars for various languages	2	2	2		2	2	2						3	
CO-4	Design push-down automata from grammars and grammar to PDA	2	2	2		2	2	2						2	
CO-5	Design Turing machines for simple languages and design problem reductions to determine the undecidability of languages	2	2	2		2	2	2						2	
		2	**2.2**	**2.25**		**2**	**2**	**2**						**2.6**	