SRM INSTITUTE OF SCIENCE & TECHNOLOGY
—Deemed to be University—

SRM INSTITUTE OF SCIENCE AND TECHNOLOGY
FACULTY OF ENGINEERING AND TECHNOLOGY
SCHOOL OF COMPUTING
DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING
COURSE PLAN

CourseCode:15CS301
CourseTitle: Theoryof Computation
Semester :VI/IV
CourseTime: Jan 2018-May 2018

Session Details

SECTION	DAY ORDER	PERIOD	TIMINGS
B - I	2	6,7	12.30-2.15pm
	4	8	2.20-3.10pm
	5	4	10.40-11.30am
B - II	2	1,2	8.00-9.40am
	4	3	9.45-10.35am
	5	9	3.15-4.05pm

Location:S.R.M.E.C-TechPark

Faculty Details

Group	Name	OFFICE	OFFICE HOURS	Mail id
I	P.John Paul	TP805	Monday to Friday 8.00 AM to 4.05 PM	johnpaul.p@ktr.srmuniv.ac.in
II	P.John Paul	TP403	Monday to Friday 8.00 AM to 4.05 PM	johnpaul.p@ktr.srmuniv.ac.in

TEXT BOOK

1. E.Hopcroft and J.D.Ullman, “Introduction to Automata Theory, Languages and Computation”, Pearson, Education Publishers, 2nd Edition, 2004

REFERENCE BOOKS

1. Michael Sipser, “Introduction to the Theory of Computation”, Thomson Asia, 2004
2. J.C.Martin, “Introduction to Languages and Theory of Computation”, McGraw Hill,2003
3. K.L.P. Mishra, N.Chandrasekaran , “ Theoretical Computer Science “, PHI, 3rd Edition, 2007

15CS301	Theory of Computation	L	T	P	C
		3	0	0	3
Co-requisite:	Nil				
Prerequisite:	Nil				
Data Book / Codes/Standards	Nil				
Course Category	P Professional Core				
Course designed by	Department of Computer Science and Engineering				
Approval	32nd Academic Council Meeting , 23rd July 2016				

PURPOSE	The purpose of the course is to understand all basic concepts in theoretical Computer science.							
INSTRUCTIONAL OBJECTIVES		**STUDENT OUTCOMES**						
At the end of the course, student will be able to								
1.	To understand and design various Computing models like Finite State Machine, Pushdown Automata, and Turing Machine.	a						
2.	To understand the various types of grammar and the corresponding languages	a						
3.	To understand Decidability and Undecidability of various problems	a						
4.	To understand the computational complexity of various problems	a						

Session	Description of Topic	Contact hours	C-D-I-O	I O s	Reference
UNIT I: FINITE AUTOMATA		**10**			
1.	Introduction: Basic Mathematical Notation and techniques	1	C	1	1,2,5
2.	Finite State systems, Basic Definitions, Finite Automaton : DFA	1	C,D	1	1,2
3.	Finite Automaton : NDFA, Finite Automaton with €- moves	1	C,D	1	1,5
4.	Regular Languages- Regular Expression	1	D	1,2	1,5
5.	Equivalence of NFA and DFA	1	C,D	1	1,2
6.	Equivalence of NDFA's with and without €-moves	1	C,D	1	1,4
7.	Equivalence of finite Automaton and regular expressions	2	C,D	1,2	1,2,3
8.	Minimization of DFA	1	C,D	1	1,3
9.	Pumping Lemma for Regular sets, Problems based on Pumping Lemma	1	C	2	1
UNIT II: GRAMMARS		**8**			
10.	Grammar Introduction: Types of Grammar, Context Free Grammars and Languages	1	C	2	1
11.	Derivations, Ambiguity, Relationship between derivation and derivation trees	1	C	2	1,5
12.	Simplification of CFG: Elimination of Useless Symbols	1	C,D	2	1,5
13.	Simplification of CFG: Unit productions , Null productions	1	C,D	2	1,4
14.	Chomsky normal form	1	C	2	1,2,3
15.	Problems related to CNF	1	C,D	2	1,2,3
16.	Greiback Normal form	1	C	2	1,4,5
17.	Problems related to GNF	1	C,D	2	1,4,5
UNIT III: PUSHDOWN AUTOMATA		**9**			
18.	Pushdown Automata: Definitions Moves, Instantaneous descriptions	1	C	1	1,4
19.	Deterministic pushdown automata	1	C,D	1	1,5
20.	Problems related to DPDA	2	C,D	1	1,5
21.	Non - Deterministic pushdown automata	1	C,D	1	1,5
22.	Equivalence : Pushdown automata to CFL	1	C,D	1,2	1,3
23.	Equivalence : CFL to Pushdown automata	1	C,D	1,2	1,3
24.	Problems related to PDA to CFG and CFG to PDA	1	C,D	1,2	1,3,4
25.	Pumping lemma for CFL, Problems based on pumping Lemma	1	C	2	1
UNIT IV: TURING MACHINE		**9**			
26.	Turing Machines: Introduction, Formal definition of Turing machines, Instantaneous descriptions	1	C	1	1,2
27.	Turing Machine as Acceptors	1	C,D	1	1,2

Session	Description of Topic	Contact hours	C-D-I-O	IOs	Reference
28.	Problems related to Turing Machine as Acceptors	2	C,D	1	1,3
29.	Turing Machine for computing functions(Transducer)	3	C,D	1	1,4
30.	Turing Machine constructions	1	C	1	1,3
31.	Modifications of Turing Machines	1	C	1	1,3
UNIT V: COMPUTATIONAL COMPLEXITY		**9**			
32.	Undecidability :Basic definitions, Decidable problems	1	C	3	1,2,4
33.	Examples of undecidable problems	1	C	3	1,2,4
34.	Rice's Theorem	1	C	3	2,3,5
35.	Undecidable problems about Turing Machine – Post's Correspondence Problem	2	C,D	3	1,2
36.	Properties of Recursive and Recursively enumerable languages	1	C	3	2
37.	Introduction to Computational Complexity: Definitions, Time and Space complexity of TMs	1	C	4	2
38.	Complexity classes: Class P, Class NP	1	C	4	2,3
39.	Complexity classes: Introduction to NP-Hardness and NP-Completeness	1	C	4	2,3
Total contact hours		**45**			

LEARNING RESOURCES	
Sl. No.	**TEXT BOOKS**
1.	Hopcroft J.E., Motwani R. and Ullman J.D. *"Introduction to Automata Theory, Languages and Computations"*, Second Edition, Pearson Education, 2008.
2.	Michael Sipser, *"Introduction to the Theory of Computation"* Cengage Learning, 2012.
	REFERENCE BOOKS/OTHER READING MATERIAL
3.	John.C.Martin, *"Introduction to Languages and the Theory of Computation"* McGraw-Hill Education, 01- May-2010.
4.	Kamala Krithivasan, Rama.R, *" Introduction to Formal Languages, Automata Theory and Computation"*, Pearson Education India, 01-Sep-2009.
5.	Peter Linz , *"An introduction to formal languages and automata"*, Jones & Bartlett Learning, 2001.

ONLINEREFERE NCES

http://www.cis.upenn.edu/~cis511/

http://en.wikipedia.org/wiki/Theory_of_computation

http://geisel.csl.uiuc.edu/~loui/sdcr/

http://www.math.niu.edu/~rusin/known-math/index/68OXX.html#INTRO

http://www.eecs.harvard.edu/theory/

http://www.cse.ohio-state.edu/~gurari/theory-bk/theory-bk.html

Prerequisite : CS0202 – Principles of Programming Languages

Objectives

1. To studythe concepts ofVarious languages
2. To learn about thevarious computingdevices likeFSM,PDA,Turingmachines
3. To learn thevarious computabilityconcepts

AssessmentDetails

Cycle Test – I : 15 Marks
Surprise Test – I: 5 Marks
Cycle Test-II : 25 Marks (Model)
Assignment: 5 Marks

TestSchedule

S.No.	DATE	TEST	TOPICS	DURATION
1	As per schedule	CycleTest-I	UnitI &II	2 periods
2	As per schedule	Cycle Test-II	All 5 units	3Hrs

Prepared by

Staff Name:P.JOHN PAUL

Signature: P. John Paul 3/1/18

3/1/18

HOD/CSE