Lovely Professional University, Punjab

Course Code	Course Title	Course Planner	Lectures	Tutorials	Practicals	Credits
CSE322	FORMAL LANGUAGES AND AUTOMATION THEORY	11057::Gaurav Pushkarna	3	0	0	3

Course Outcomes :Through this course students should be able to

CO1 :: analyze the fundamentals of theory of computation and design an infinite language in finite ways through deterministic finite automata, non deterministic finite automata

CO2 :: apply an infinite language in finite ways through regular expressions and understanding the properties of regular languages

CO3 :: illustrate context free grammar and pushdown automata for a given Language

CO4 :: formulate different abstract models like DFA, NDFA, PDA, CFGs and Turing machines for various computational problems

CO5 :: discuss properties of pushdown automata, context free language and abstract model of computing machine through turing machine

CO6 :: define whether a problem is decidable or undecidable

	TextBooks (T)		
Sr No	**Title**	**Author**	**Publisher Name**
T-1	THEORY OF COMPUTER SCIENCE: AUTOMATA, LANGUAGES & COMPUTATION	K.L.P. MISHRA & N. CHANDRASEKARAN	PRENTICE HALL

	Reference Books (R)		
Sr No	**Title**	**Author**	**Publisher Name**
R-1	AUTOMATA, COMPUTABILITY AND COMPLEXITY: THEORY AND APPLICATIONS	ELAINE RICH	PEARSON
R-2	INTRODUCTION TO AUTOMATA THEORY, LANGUAGES, AND COMPUTATION	HOPCROFT, MOTWANI, ULLMAN	PEARSON
R-3	INTRODUCTION TO THE THEORY OF COMPUTATION	MICHAEL SIPSER	CENGAGE LEARNING
R-4	THEORY OF COMPUTATION: A PROBLEM SOLVING APPROACH	KAVI MAHESH	WILEY
R-5	INTRODUCTION TO FORMAL LANGUAGES, AUTOMATA THEORY AND COMPUTATION	KAMALA KRITHIVASAN, RAMA R.	PEARSON

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R-6	THEORY OF COMPUTATION	RAJESH K. SHUKLA	CENGAGE LEARNING
R-7	AN INTRODUCTION TO AUTOMATA THEORY AND FORMAL LANGUAGES.	ADESH K. PANDEY	S.K. KATARIA & SONS
R-8	INTRODUCTION TO THEORY OF AUTOMATA, FORMAL LANGUAGES AND COMPUTATION	SATINDER SINGH CHAHAL, GULJEET KAUR CHAHAL	A.B.S.PUBLICATION, JALANDHAR
R-9	AN INTRODUCTIONTO FORMAL LANGUAGES AND AUTOMATA	PETER LINZ	JONES & BARTLETT LEARNING
R-10	CELLULAR AUTOMATA MACHINES: A NEW ENVIRONMENT FOR MODELING	TOMMASO TOFFOLI	MIT Press

Other Reading (OR)

Sr No	**Journals articles as Compulsary reading (specific articles, complete reference)**
OR-1	Journal of Automata, Languages and Combinatorics, Otto-von-Guericke-Universitat Magdeburg, http://www.jalc.de ,
OR-2	Journal of Computer and System Sciences, http://www.sciencedirect.com/science/article/pii/S0022000002918556 ,
OR-3	An Introduction to formal languages and Automata, Peter Linz, Jones & Bartlett Learning, 2001 ,
OR-4	Theory of Automata, Formal Language and computation, S.P. Eugene Xavier, New Age Publication ,

Relevant Websites (RW)

Sr No	**(Web address) (only if relevant to the course)**	**Salient Features**
RW-1	http://www.cis.upenn.edu/~matuszek/cit596-2012/Pages/cfg7.html	Sentential Forms
RW-2	http://theory.csail.mit.edu/	At MIT, there is broad range of TOC topics, including algorithms, complexity theory, cryptography, distributed computing, computational geometry, computational biology, and quantum computing. MIT has the largest TOC research group in the world.
RW-3	http://www.princeton.edu/~achaney/tmve/wiki100k/docs/Recursively_enumerable_language.html	Recursive enumerable language
RW-4	http://nptel.iitm.ac.in/courses/106106049	Online_Video Lectures, IIT Madras
RW-5	http://www.theoryofcomputations.com/	Illustrative Examples, Short Questions, Exercises, Assignments and Question Banks on TOC.
RW-6	http://www.cs.rpi.edu/academics/courses/spring06/modcomp/	Lecture Slides from Rensselaer Polytechnic Institute (RPI). * Rensselaer is America's oldest technological research university.
RW-7	http://www.cse.ohio-state.edu/~gurari/theory-bk/theory-bk.html	Ohio State University Link: Informative material on various topics
RW-8	https://plato.stanford.edu/entries/cellular-automata/	Relevant details covering Introduction to Cellular automata, Notions, Results and Philosophy.

Audio Visual Aids (AV)		
Sr No	**(AV aids) (only if relevant to the course)**	**Salient Features**
AV-1	http://www.cs.uiuc.edu/class/sp10/cs373/lectures/	Online Video Lectures, University of Illinois at Urbana-Champaign
AV-2	http://aduni.org/courses/theory/index.php?view=cw	Video Taped lectures based on undergraduate course study of Theory of Computation at the Massachusetts Institute of Technology (MIT).
AV-3	https://www.youtube.com/watch?v=tPUWmgFw3QA&index=17&list=PL85CF9F4A047C7BF7	Online Video Lectures, IIT Madras

Software/Equipments/Databases		
Sr No	**(S/E/D) (only if relevant to the course)**	**Salient Features**
SW-1	Visual Automata Simulator 1.2.2	A tool for simulating, visualizing and transforming finite state automata and Turing Machines.
SW-2	http://en.wikipedia.org/wiki/Automata-based_programming	Web Link on various ways, to practically implement concepts of TOC/Automata.
SW-3	dk.brics.automaton 1.11-8	This Java package contains a DFA/NFA (finite-state automata) implementation with Unicode alphabet (UTF16) and support for the standard regular expression operations (concatenation, union, Kleene star) and a number of non-standard ones (intersection, complement, etc.)

Virtual Labs (VL)		
Sr No	**(VL) (only if relevant to the course)**	**Salient Features**
VL-1	http://www.virlab.virginia.edu/VL/QCA_cells.htm	Virtual Lab from University of Virginia in Charlottesville, VA. In computers of the future, transistors may be replaced by assemblies of quantum dots called "Quantum-dot Cellular Automata" (QCA's).This page describes how QCA's can store and move information.
VL-2	http://www.virlab.virginia.edu/VL/QCA_logic.htm	Virtual Lab from University of Virginia in Charlottesville, VA. Describes how "Quantum-dot Cellular Automata" (QCA's) can be made into MAJORITY, OR, AND, and INVERTER logic gates.

LTP week distribution: (LTP Weeks)	
Weeks before MTE	7
Weeks After MTE	7
Spill Over (Lecture)	7

Detailed Plan For Lectures

Week Number	Lecture Number	Broad Topic(Sub Topic)	Chapters/Sections of Text/reference books	Other Readings, Relevant Websites, Audio Visual Aids, software and Virtual Labs	Lecture Description	Learning Outcomes	Pedagogical Tool Demonstration/ Case Study / Images / animation / ppt etc. Planned	Live Examples

Week 1	Lecture 1	FINITE AUTOMATA (Definition and Description of a Finite Automaton)	R-2	RW-4 RW-6 SW-3	Lecture 1: Lecture#0. Lecture 2: Basic description of Strings and Alphabets and Deterministic and Nondeterministic Finite State Machines	Students will learn about Strings and Alphabets	Demonstration with Power Point Presentation	Switch Bulb
		FINITE AUTOMATA (Deterministic and Non-deterministic Finite State Machines)	R-2	RW-4 RW-6 SW-3	Lecture 1: Lecture#0. Lecture 2: Basic description of Strings and Alphabets and Deterministic and Nondeterministic Finite State Machines	Students will learn about Strings and Alphabets	Demonstration with Power Point Presentation	Switch Bulb
		FINITE AUTOMATA (Basics of Strings and Alphabets)		RW-4 RW-6 SW-3	Lecture 1: Lecture#0. Lecture 2: Basic description of Strings and Alphabets and Deterministic and Nondeterministic Finite State Machines	Students will learn about Strings and Alphabets	Demonstration with Power Point Presentation	Switch Bulb
	Lecture 2	FINITE AUTOMATA (Definition and Description of a Finite Automaton)	R-2	RW-4 RW-6 SW-3	Lecture 1: Lecture#0. Lecture 2: Basic description of Strings and Alphabets and Deterministic and Nondeterministic Finite State Machines	Students will learn about Strings and Alphabets	Demonstration with Power Point Presentation	Switch Bulb
		FINITE AUTOMATA (Deterministic and Non-deterministic Finite State Machines)	R-2	RW-4 RW-6 SW-3	Lecture 1: Lecture#0. Lecture 2: Basic description of Strings and Alphabets and Deterministic and Nondeterministic Finite State Machines	Students will learn about Strings and Alphabets	Demonstration with Power Point Presentation	Switch Bulb
		FINITE AUTOMATA (Basics of Strings and Alphabets)		RW-4 RW-6 SW-3	Lecture 1: Lecture#0. Lecture 2: Basic description of Strings and Alphabets and Deterministic and Nondeterministic Finite State Machines	Students will learn about Strings and Alphabets	Demonstration with Power Point Presentation	Switch Bulb
	Lecture 3	FINITE AUTOMATA (Acceptability of a String by a Finite Automaton)	R-6 R-9	SW-2	Basic description of Transition graph and properties of Transition function	Students will learn about the use of transition function in finite automata	Demonstration with Power Point Presentation	Thermostats

Week 1	Lecture 3	FINITE AUTOMATA (Transition Graph and Properties of Transition Functions)	T-1	SW-1	Working of finite automata to accept a string	Students will learn whether a string is acceptable or not acceptable by finite automata	White board, Live demonstration using JFLAP simulator	Thermostats
Week 2	Lecture 4	FINITE AUTOMATA(The Equivalence of Deterministic and Non-deterministic Finite Automata)	T-1	AV-1	Relation between DFA and NDFA	Students will learn about the relation between DFA and NDFA	Numerical Problem Solving	Thermostats
	Lecture 5	FINITE AUTOMATA (Mealy and Moore Machines)	T-1		Conversion of Mealy to Moore and Moore to Mealy machine	Students will learn how to convert Mealy to Moore and Moore to Mealy machine	White board, Demonstration using JFLAP simulator	Switch Bulb and Elevators
		FINITE AUTOMATA (Regular Languages)	R-7		Basic Description of Regular languages	Students will learn about the regular languages	Demonstration with Power Point Presentation	Switch Bulb
	Lecture 6	FINITE AUTOMATA (Minimization of Finite Automata)	T-1 R-5	OR-3	Step by Step procedure to construct minimum automaton	Students will learn to reduce a Complex Finite Automata	White board, Numerical Problem Solving	Switch Bulb
Week 3	Lecture 7	REGULAR EXPRESSIONS AND REGULAR SETS (Regular Expressions and Identities for Regular Expressions)	T-1	RW-6	Representation of regular expression	Students will learn the relation between Finite Automata and Regular Expression	Demonstration with Power Point Presentation	Compiler
		REGULAR EXPRESSIONS AND REGULAR SETS (Finite Automata and Regular Expressions: Transition System Containing null moves)	T-1 R-1 R-4	RW-6	Basics of Regular expressions	Students will become familiar about the regular expression	White board, Demonstration with Power Point Presentation	Finding Patterns in text
	Lecture 8	REGULAR EXPRESSIONS AND REGULAR SETS (Conversion of Non-deterministic Systems to Deterministic Systems)	T-1		Recognition of Regular expression by NDFA	Students will learn the relation between Non-deterministic Finite Automata and Regular Expressions	White board, Demonstration using JFLAP simulator	Finding patterns in text
		REGULAR EXPRESSIONS AND REGULAR SETS (Algebraic Methods using Arden's Theorem)	T-1		Extension of Arden's Theorem	Students will learn to find the regular expression recognized by a transition system	Numerical Problem Solving	Finding patterns in text

Week 3	Lecture 8	REGULAR EXPRESSIONS AND REGULAR SETS (Non-deterministic Finite Automata with Null Moves and Regular Expressions)	T-1	RW-5	Construction of Deterministic system equivalent to nondeterministic system	Students will learn the relations between deterministic and non-deterministic system	White board, Demonstration with Power Point Presentation	Finding patterns in text
	Lecture 9	REGULAR EXPRESSIONS AND REGULAR SETS (Equivalence of Two Finite Automata and Two Regular Expressions)	T-1		Relation of Regular Expression and Finite Automata	Students will undersatnd the concept of equivalence between regular expression and finite automata Lecture cum demonstrations	Numerical Problem Solving	Finding patterns in text
		REGULAR EXPRESSIONS AND REGULAR SETS (Closure Properties of Regular Sets)	T-1		Description of various properties of regular set	Students will learn that class of regular set is closed under union,concatenation and closure	Demonstration with Power Point Presentation	Finding patterns in text
		REGULAR EXPRESSIONS AND REGULAR SETS (Equivalence between regular languages: Construction of Finite Automata Equivalent to a Regular Expression)	T-1		Relation of Regular Expression and Finite Automata	Students will undersatnd the concept of equivalence between regular expression and finite automata	Demonstration with JFLAP simulator	Finding patterns in text
Week 4	Lecture 10	REGULAR EXPRESSIONS AND REGULAR SETS (Pumping Lemma for Regular Sets and its Application)	T-1 R-2		Conditions for a string to belong to regular sets and application of Pumping lemma	Students will be able to test whether string belong to regular set or not	Demonstration using JFLAP simulator	Finding patterns in text
	Lecture 11				Online Assignment			
	Lecture 12	REGULAR EXPRESSIONS AND REGULAR SETS (Construction of Finite Automata Equivalent to a Regular Expression)	T-1		Subset method	Students will learn the use of subset method	White board, Demonstration using JFLAP simulator	Finding patterns in text
		REGULAR EXPRESSIONS AND REGULAR SETS (Properties of Regular Languages)	T-1		Various properties of regular languages along with its usage in pumping lemma	Students will learn the concept of union ,intersection,iteration in regular languages	Demonstration with Power Point Presentation	Finding patterns in text

Week 5	Lecture 13	REGULAR EXPRESSIONS AND REGULAR SETS (Myhill-Nerode Theorem)	R-3	AV-3	Description of Myhill–Nerode theorem for regularity test of a language.	Students will learn about necessary and sufficient condition for a language to be regular.	Demonstration with Power Point Presentation	Tree automata
	Lecture 14	FORMAL LANGUAGES AND REGULAR GRAMMARS(Definition of a Grammar)	T-1	OR-1	Derivations and languages generated by grammer	Students will learn to derive a language from a given grammar	Demonstration with Power Point Presentation and JFLAP simulator	Compiler
		FORMAL LANGUAGES AND REGULAR GRAMMARS(Languages Generated by a Grammar)	T-1 R-8	OR-1	Introduction to Grammars and its significance	Students will understand the significance of grammar	Demonstration with Power Point Presentation and JFLAP simulator	Compiler
		FORMAL LANGUAGES AND REGULAR GRAMMARS(Chomsky Classification of Languages)	T-1		Classification of languages	Students will learn about various types of Formal Languages	Demonstration with Power Point Presentation	Compiler
	Lecture 15	FORMAL LANGUAGES AND REGULAR GRAMMARS(Recursive and Recursively Enumerable Sets)	T-1 R-2 R-5	RW-3	Use of Recursive and Recursively Enumerable Languages in undecidability	Students will learn about the use of recursive set	Demonstration with Power Point Presentation	Compiler
		FORMAL LANGUAGES AND REGULAR GRAMMARS(REGULAR GRAMMARS: Regular Sets and Regular Grammars)	T-1 R-2 R-5	RW-3	Description of regular sets and regular grammar	Students will learn about regular sets and regular grammar	Demonstration with Power Point Presentation	Compiler
Week 6	Lecture 16	FORMAL LANGUAGES AND REGULAR GRAMMARS(Languages and Automata)	T-1		Relation between 4 types of languages and automata	Students will learn the relationship between TM,LBA,PDA and FA	Demonstration with Power Point Presentation	Elevators
		FORMAL LANGUAGES AND REGULAR GRAMMARS(Chomsky hierarchy of Languages)	T-1		Hierarchy of Languages	Students will learn about hierarchical relationship of various types of formal Languages	Demonstration with Power Point Presentation	
	Lecture 17	FORMAL LANGUAGES AND REGULAR GRAMMARS(Converting Regular Expressions to Regular Grammars)	R-8		Construction of regular grammar for a given regular expression	Students will learn the relation between regular grammar and regular Expression	White board, Demonstration with Power Point Presentation	Compiler

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Week 6	Lecture 18	FORMAL LANGUAGES AND REGULAR GRAMMARS(Converting Regular Grammars to Regular Expressions)	T-1 R-8		Construction of a regular expression for a given regular grammar	Students will learn to derive a regular expression from a regular grammar	White board, Demonstration with Power Point Presentation	Compiler
		FORMAL LANGUAGES AND REGULAR GRAMMARS(Left Linear and Right Linear Regular Grammars)	T-1 R-8		Difference between Left Linear and Right Linear Regular Grammars	Students will learn to visualize derivations in regular languages	White board, Demonstration with Power Point Presentation	Finding patterns in text
Week 7	Lecture 19				Online Assignment			
		SPILL OVER						
Week 7	Lecture 20				Spill Over			
	Lecture 21				Spill Over			
		MID-TERM						
Week 8	Lecture 22	CONTEXT- FREE LANGUAGES AND SIMPLIFICATION OF CONTEXT-FREE GRAMMAR(Context-Free Languages and Derivation Trees)	T-1	AV-2	Introduction of context free grammar	Students will learn to visualize derivations of Context Free Grammar	White board, Demonstration with Power Point Presentation	
		CONTEXT- FREE LANGUAGES AND SIMPLIFICATION OF CONTEXT-FREE GRAMMAR(Leftmost and Rightmost derivations)	T-1	AV-1	Different ways of deriving a grammar	Students will learn about the difference between left and right derivation of grammar	White board, Demonstration with Power Point Presentation	
	Lecture 23	CONTEXT- FREE LANGUAGES AND SIMPLIFICATION OF CONTEXT-FREE GRAMMAR(Language of a Context Free Grammar)	T-1	OR-2	Description of the languages generated corresponding to a particular grammar	Students will learn the construction of languages corresponding to a particular grammar	Demonstration with Power Point Presentation	
		CONTEXT- FREE LANGUAGES AND SIMPLIFICATION OF CONTEXT-FREE GRAMMAR(Applications of Context Free Grammar)	T-1		Applications of context free grammar	Students will learn about real life examples of Context Free Grammars	Demonstration with Power Point Presentation	

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Week 8	Lecture 23	CONTEXT- FREE LANGUAGES AND SIMPLIFICATION OF CONTEXT-FREE GRAMMAR(Sentential forms)		RW-1	Sentential forms of context free grammar	Students will learn the importance of sentential forms and its derivation	Demonstration with Power Point Presentation	
	Lecture 24	CONTEXT- FREE LANGUAGES AND SIMPLIFICATION OF CONTEXT-FREE GRAMMAR(Pumping Lemma for Context Free Grammar)	T-1		Rules of Pumping lemma for Context free languages and applications of pumping lemma	Students will learn to test whether the language is context free or not	Demonstration using JFLAP simulator	
Week 9	Lecture 25	CONTEXT- FREE LANGUAGES AND SIMPLIFICATION OF CONTEXT-FREE GRAMMAR(Pumping Lemma for Context Free Grammar)	T-1		Rules of Pumping lemma for Context free languages and applications of pumping lemma	Students will learn to test whether the language is context free or not	Demonstration using JFLAP simulator	
	Lecture 26	CONTEXT- FREE LANGUAGES AND SIMPLIFICATION OF CONTEXT-FREE GRAMMAR(Ambiguity in Context Free Grammar)	T-1		Procedure of finding the ambiguity in context free grammar	Students will learn to check whether the grammar is ambiguous or not	Numerical Problem Solving	
	Lecture 27	CONTEXT- FREE LANGUAGES AND SIMPLIFICATION OF CONTEXT-FREE GRAMMAR(Construction of Reduced Grammars)	T-1		Different ways to reduce Context Free Grammar	Students will learn the methods to simplify context free grammar	Numerical Problem Solving	
		CONTEXT- FREE LANGUAGES AND SIMPLIFICATION OF CONTEXT-FREE GRAMMAR(Elimination of null and unit productions)	T-1		Method to eliminate null and unit production	Students will learn the concept of reduction of grammars.	White board, Numerical Problem Solving	
Week 10	Lecture 28	CONTEXT- FREE LANGUAGES AND SIMPLIFICATION OF CONTEXT-FREE GRAMMAR(Normal Forms for Context Free Grammar - Chomsky Normal Form, Greibach Normal Form)	T-1	RW-6	Description of various types of normal forms for context free grammars	Students learn to reduce the Context free grammars into CNF and GNF	Numerical Problem Solving	

Week 10	Lecture 29	CONTEXT- FREE LANGUAGES AND SIMPLIFICATION OF CONTEXT-FREE GRAMMAR(Normal Forms for Context Free Grammar - Chomsky Normal Form, Greibach Normal Form)	T-1	RW-6	Description of various types of normal forms for context free grammars	Students learn to reduce the Context free grammars into CNF and GNF	Numerical Problem Solving	
	Lecture 30	PUSHDOWN AUTOMATA AND PARSING (Representation of Pushdown Automata)	T-1 R-7	RW-4	Method to Represent Push Down Automata	Students learn the Basics of Push Down Automata	Demonstration with Power Point Presentation	
		PUSHDOWN AUTOMATA AND PARSING (Description and Model of Pushdown Automata)	T-1	RW-4	Description and model of Push Down Automata	Students will learn the basics of Push Down Automata	Demonstration with Power Point Presentation	
Week 11	Lecture 31	PUSHDOWN AUTOMATA AND PARSING (Acceptance by Pushdown Automata)	T-1	OR-4	Types of acceptance by Pushdown Automata	Students will learn to check whether a input string is acceptable by PDA or not	Demonstration with Power Point Presentation	
	Lecture 32	PUSHDOWN AUTOMATA AND PARSING(Pushdown Automata: Deterministic Pushdown Automata and non-deterministic Pushdown Automata)	T-1		Types of push down automata	Students will learn the difference between Deterministic PDA and NonDeterministic PDA	Demonstration with Power Point Presentation	
		PUSHDOWN AUTOMATA AND PARSING(Context free languages and Pushdown Automata)	T-1		Conversion of Push Down Automata into Context Free grammar	Students will learn the relationship between CFL and PDA	Demonstration with Power Point Presentation	
		PUSHDOWN AUTOMATA AND PARSING(Pushdown Automata and Context-Free Languages)	T-1		Conversion of Context free grammar into Push down Automata	Students will learn the relationship between Push Down Automata and Context Free Languages	Demonstration with Power Point Presentation	
	Lecture 33				Online Assignment			
Week 12	Lecture 34	PUSHDOWN AUTOMATA AND PARSING (Comparison of deterministic and non-deterministic versions)	R-1		Description about Comparison of deterministic and non-deterministic versions	Students will learn the difference between deterministic and non-deterministic versions	Demonstration with Power Point Presentation	

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Week 12	Lecture 34	PUSHDOWN AUTOMATA AND PARSING(closure properties)	R-1		Description of the closure properties of CNF	Students will learn the closure properties of CNF	Demonstration with Power Point Presentation	
	Lecture 35	PUSHDOWN AUTOMATA AND PARSING(PARSING: Top-Down and Bottom-Up Parsing)	T-1		Basics of Top down and Bottom up parsing	Students will learn the difference between Top down and Bottom up Parsing	Demonstration with Power Point Presentation	
		PUSHDOWN AUTOMATA AND PARSING(LL (k) Grammars and its Properties)	T-1		Basics of LL(k) in Parsing	Students will learn the Purpose of LL(k) in Parsing	Demonstration with Power Point Presentation	
		PUSHDOWN AUTOMATA AND PARSING(LR(k) Grammars and its Properties)	T-1		Basics of LR(k) in Parsing	Students will learn the Purpose of LR(k) in Parsing	Demonstration with Power Point Presentation	
	Lecture 36	TURING MACHINES AND COMPLEXITY(Turing Machine Model)	T-1 R-8 R-9	AV-1	Various ways to represent Turing Machines	Students will learn the basics of Turing Machines	Demonstration with Power Point Presentation	
		TURING MACHINES AND COMPLEXITY (Representation of Turing Machines)	T-1 R-8 R-9	AV-1	Description of Turing machine	Students will learn the basics of Turing Machines	Demonstration using JFLAP simulator	Digital computers
		TURING MACHINES AND COMPLEXITY(Design of Turing Machines)	T-1 R-8 R-9		Methods of designing Turing Machines	Students will learn to design and construct Turing Machines	Demonstration using JFLAP simulator	
		TURING MACHINES AND COMPLEXITY(Variations of TM)	T-1 R-8 R-9	AV-1	Various ways to represent Turing Machines	Students will learn the basics of Turing Machines	Demonstration with Power Point Presentation	
Week 13	Lecture 37	TURING MACHINES AND COMPLEXITY(Design of Turing Machines)	T-1 R-8 R-9		Methods of designing Turing Machines	Students will learn to design and construct Turing Machines	Demonstration using JFLAP simulator	
	Lecture 38	TURING MACHINES AND COMPLEXITY(The Model of Linear Bounded Automaton)	T-1	VL-1 VL-2	Description of Model of Linear Bounded Automaton	Students will learn the need of Model of Linear Bounded Automaton	Demonstration with Power Point Presentation	
		TURING MACHINES AND COMPLEXITY(Power of LBA)	T-1 R-2	VL-1 VL-2	Basics of Linear Bounded Automaton	Students will learn the importance of Linear Bounded Automaton	Demonstration with Power Point Presentation	

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Week 13	Lecture 38	TURING MACHINES AND COMPLEXITY(Non-Deterministic Turing Machines)	T-1	VL-1 VL-2	Description of Non Deterministic Turing Machines	Students will learn the importance of Non Deterministic Turing Machines	Demonstration with Power Point Presentation	
		TURING MACHINES AND COMPLEXITY(Power of Linear Bounded Automaton)	T-1 R-2	VL-1 VL-2	Basics of Linear Bounded Automaton	Students will learn the importance of Linear Bounded Automaton	Demonstration with Power Point Presentation	
		TURING MACHINES AND COMPLEXITY(Cellular automaton)	R-10	RW-8	Basics of cellular Automaton	Students will learn the importance of cellular Automaton	Demonstration with Power Point Presentation	
	Lecture 39	TURING MACHINES AND COMPLEXITY(Halting Problem of Turing Machine)	R-2 R-3 R-8	RW-2 AV-2	Description of Halting Problem	Students will learn the reduction technique used to prove the undecidability in Turing Machine	Demonstration with Power Point Presentation	
		TURING MACHINES AND COMPLEXITY(Post Correspondence Problem)	R-2 R-3 R-8	RW-2 AV-2	Description of Undecidable decision problems	Students will learn about proofs of undecidability	Demonstration with Power Point Presentation	
		TURING MACHINES AND COMPLEXITY (RECURSIVELY ENUMERABLE LANGUAGE)	R-2 R-8		Description of recursively enumerable language	Students will learn about recursively enumerable language	Demonstration with Power Point Presentation	
Week 14	Lecture 40	TURING MACHINES AND COMPLEXITY(Basic Concepts of Computability)	R-5 R-9	RW-7 SW-3	Basics of Computability	Students will learn the use of computability	Demonstration with Power Point Presentation	
		TURING MACHINES AND COMPLEXITY(Decidable and Undecidable languages)	R-5 R-9	RW-7 SW-3	Description of Decidable and Undecidable languages	Students will learn the difference between Decidable and Undecidable languages	Demonstration with Power Point Presentation	
		TURING MACHINES AND COMPLEXITY (Computational Complexity: Measuring Time & Space Complexity)	R-5 R-9	RW-7 SW-3	Types of Complexity	Students will learn about variants of Complexity	Demonstration with Power Point Presentation	
		SPILL OVER						
Week 14	Lecture 41				Spill Over			
	Lecture 42				Spill Over			

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Week 15	Lecture 43				Spill Over				
	Lecture 44				Spill Over				
	Lecture 45				Spill Over				

An instruction plan is only a tentative plan. The teacher may make some changes in his/her teaching plan. The students are advised to use syllabus for preparation of all examinations. The students are expected to keep themselves updated on the contemporary issues related to the course. Upto 20% of the questions in any examination/Academic tasks can be asked from such issues even if not explicitly mentioned in the instruction plan.