

FR. Conceicao Rodrigues College Of Engineering

Father Agnel Ashram, Bandstand, Bandra-west, Mumbai-50

Department of Computer Engineering

S.E. (Information Technology) (semester IV) (2018-2019)

Lecture Plan:

Subject: Automata Theory

Subject Code: - ITC405

1. Syllabus

Sr. No.	Module	Detailed Content	Hours	CO Mapping
I	Introduction and Regular Languages	Languages: Alphabets and Strings. Regular Languages: Regular Expressions, Regular Languages, Regular Grammars, RL and LL grammars, Closure properties	06	CO1
II	Finite Automata and machines	Finite Automata: FA as language acceptor or verifier, NFA (with and without ϵ), DFA, RE to NFA, NFA to DFA, Reduced DFA , NFA-DFA equivalence, FA to RE. Finite State Machines: m/c with output Moore and Mealy machines. M/c as translators. Melay and Moore m/c conversion	09	CO2
III	Context Free Grammars	Context Free Languages: CFG, Leftmost and Rightmost derivations, Ambiguity, Simplification and Normalization (CNF) and Chomskey Hierarchy (Types 0 to 3)	08	CO3
IV	Push Down Automata	Push Down Automata: Deterministic (single stack)PDA, Equivalence between PDA and CFG.	05	CO4
V	Turing	Turing Machine: Deterministic TM ,	07	CO5

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	Machine	Multi-track and Multi-tape TMs, concept of UTM and idea of system program. Issue and concept of Halting Problem		
VI	Applications of Automata	Power and Limitations of Regular and Context Free Grammars and Machines Designing Functions: FA: Acceptor and Verifier. FSM: Translator PDA: Simple Parser for WF parenthesis, palindromes etc. TM: Basic bit wise calculator(+ /- /AND/OR) and Translator (Note Added)	04	CO2 CO4 CO5 CO6

Text books

J.C.Martin, "Introduction to languages and the Theory of Computation", TMH.

Kavi Mahesh, "Theory of Computation A Problem Solving Approach", Wiley India

References

John E. Hopcroft, Rajeev Motwani, Jeffrey D. Ullman, "Introduction to Automata Theory, Languages and Computation", Pearson Education.

Daniel I.A. Cohen, "Introduction to Computer Theory", John Wiley & Sons.

Theory of Computation - By Vivek Kulkarni from Oxford University.

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N.Chandrashekhara & K.L.P. Mishra, "Theory of Computer Science, Automata Languages & Computations", PHI publications.

2. Course Outcome Statement

After completing the course successfully, students will be able to:

CO	Description
CO1	Understand, design, construct, analyze and interpret Regular languages, Expression and Grammars.
CO2	Design different types of Finite Automata and Machines as Acceptor, verifier and Translator
CO3	Understand, design, analyze and interpret Context Free languages, Expression and Grammars.
CO4	Design different types of Push down Automata as Simple Parser.
CO5	Design different types of Turning Machines as Acceptor, Verifier, Translator and Basic Computing machine.
CO6	Compare, Understand and analyze different languages, grammars, Automata and Machines and appreciate their power and convert Automata to Programs and Functions.

3. CO-PO and CO-PSO Mapping

CO NO	PO 1	PO2	PO3	PO4	PO5	PO6	PO7	PO 8	PO9	PO1 0	PO11	PO12	PSO 1	PSO2
CO1	1	2	3	2	1	--	2	--	1	--	--	--	1	2
CO2	1	1	3	2	1	--	--	--	--	--	--	--	1	2
CO3	1	2	3	2	1	--	2	--	1	--	--	--	1	2
CO4	1	1	3	2	1	--	--	--	--	--	--	--	1	2
CO5	1	1	3	2	1	--	--	--	--	--	--	--	1	2
CO6	2	2	2	2	1	--	2	--	--	--	--	--	1	2

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4. CO Assessment Tools

CO	Direct Methods				Indirect Methods
	Test	Tutorial	End Semester	Total	Course Exit Survey
CO1	40	30	30	100%	100%
CO2	40	30	30	100%	100%
CO3	40	30	30	100%	100%
CO4	40	30	30	100%	100%
CO5	--	70	30	100%	100%
CO6	--	70	30	100%	100%

5. Curriculum Gap/Content beyond syllabus (if any).

No such Gap found

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No of classes available:	39	No of Classes taken:	44	
Sr. No.	Topic Planned	Planned Date	Actual Date	Delivery Mechanisms
1	Introduction to Regular Languages	01/01/2019	01/01/2019	Chalk & Board
2	Languages, Alphabets and Strings.	02/01/2019	02/01/2019	Chalk & Board
3	Regular Languages, Regular Expressions	04/01/2019	04/01/2019	Chalk & Board
4	Regular Grammars, RL and LL grammars	07/01/2019	07/01/2019	Chalk & Board
5	Closure properties	08/01/2019	08/01/2019	Chalk & Board
6	Finite Automata and machines, FA as language acceptor or verifier	9/01/2019	09/01/2019	Chalk & Board
7	NFA (with and without ϵ)	11/01/2019	11/01/2019	Chalk & Board
8	DFA, RE to NFA	14/01/2019	14/01/2019	Chalk & Board
9	NFA to DFA Reduced DFA	15/01/2019	15/01/2019	Chalk & Board
10	NFA-DFA Equivalence	26/01/2019	15/01/2019	Chalk & Board
11	FA to RE	21/01/2019	16/01/2019	Chalk & Board
12	Moore and Mealy machines. M/c as Translators.	22/01/2019	21/01/2019	Chalk & Board
13	Moore and Mealy machines. M/c as Translators.	23/01/2019	22/01/2019	Chalk & Board
14	Melay and Moore m/c conversion	28/01/2019	28/01/2019	Chalk & Board
15	Context Free Grammars Context Free Languages	29/01/2019	28/01/2019	Chalk & Board
16	CFG, Leftmost and Rightmost derivations	30/01/2019	28/01/2019	Chalk & Board
17	Ambiguity Simplification and Normalization (CNF)	11/02/2019	29/01/2019	Chalk & Board
18	Chomsky Hierarchy (Types 0 to 3)	12/02/2019	30/01/2019	Chalk & Board
19	Push Down Automata :Deterministic (single stack) PDA	13/02/2019	11/02/2019	Chalk & Board
20	Push Down Automata :Deterministic (single stack) PDA	18/02/2019	12/02/2019	Chalk & Board
21	Equivalence between PDA and CFG.	20/02/2019	18/02/2019	Chalk & Board
22	Turing Machine Deterministic TM	25/02/2019	22/02/2019	Chalk & Board
23	Multi-track and Multi-tape TMs	26/02/2019	25/02/2019	Chalk & Board
24	Concept of UTM and idea of system	27/02/2019	25/02/2019	Chalk & Board

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	Program.			
25	Issue and concept of Halting Problem	05/03/2019	25/02/2019	Chalk & Board
26	Applications of Automata Theory	06/03/2019	26/02/2019	Chalk & Board
27	Applications of Automata Theory	11/03/2019	26/02/2019	Chalk & Board
28	Power and Limitations of Regular and Context Free Grammars and Machines	12/03/2019	27/02/2019	Chalk & Board
29	Power and Limitations of Regular and Context Free Grammars and Machines	13/03/2019	11/03/2019	Chalk & Board
30	Designing Functions FA Acceptor and Verifier.	18/03/2019	11/03/2019	Chalk & Board
31	Designing Functions FA Acceptor and Verifier.	19/03/2019	12/03/2019	Chalk & Board
32	FSM: Translator	20/03/2019	13/03/2019	Chalk & Board
33	FSM: Translator	20/03/2019	18/03/2019	Chalk & Board
34	PDA: Simple Parser for WF parenthesis, Palindromes etc	25/03/2019	19/03/2019	Chalk & Board
35	PDA: Simple Parser for WF parenthesis, Palindromes etc	26/03/2019	20/03/2019	Chalk & Board
36	TM: Basic bit wise calculator(+ /- /AND/OR) and Translator	27/03/2019	22/03/2019	Chalk & Board
37	TM: Basic bit wise calculator(+ /- /AND/OR) and Translator	01/04/2019	25/03/2019	Chalk & Board
38	University Question Papers solving	02/04/2019	26/03/2019	Chalk & Board
39	University Question Papers solving	03/04/2019	27/03/2019	Chalk & Board
40	University Question Papers solving	--	30/03/2019	Chalk & Board
41	University Question Papers solving	---	30/03/2019	Chalk & Board
42	University Question Papers solving	--	30/03/2019	Chalk & Board
43	Doubt Clearing Session	--	30/03/2019	Chalk & Board
44	Doubt Clearing Session	--	30/03/2019	Chalk & Board

7. Date wise lecture plan

Date	Topic Taught	Date	Topic Taught
01/01/2019	Introduction to Regular Languages	25/02/2019	Multi-track and Multi-tape TMs Concept of UTM and idea of system Program. Issue and concept of Halting Problem
02/01/2019	Languages, Alphabets and Strings.		
04/01/2019	Regular Languages, Regular Expressions		
07/01/2019	Regular Grammars, RL and LL grammars	26/02/2019	Applications of Automata Theory
08/01/2019	Closure properties		
09/01/2019	Finite Automata and machines, FA as language acceptor or	27/02/2019	Power and Limitations of Regular and Context Free Grammars and Machines

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	verifier		
11/01/2019	NFA (with and without ϵ)	11/03/2019	Power and Limitations of Regular and Context Free Grammars and Machines Designing Functions FA Acceptor and Verifier.
14/01/2019	DFA, RE to NFA		
15/01/2019	NFA to DFA Reduced DFA	12/03/2019	Designing Functions FA Acceptor and Verifier.
15/01/2019	NFA-DFA Equivalence	13/03/2019	FSM: Translator
16/01/2019	FA to RE	18/03/2019	FSM: Translator
21/01/2019	Moore and Mealy machines. M/c as Translators.	19/03/2019	PDA: Simple Parser for WF parenthesis, Palindromes etc
22/01/2019	Moore and Mealy machines. M/c as Translators.	20/03/2019	PDA: Simple Parser for WF parenthesis, Palindromes etc
28/01/2019	Melay and Moore m/c conversion Context Free Grammars Context Free Languages CFG, Leftmost and Rightmost derivations	22/03/2019	TM: Basic bit wise calculator(+ /- /AND/OR) and Translator
		25/03/2019	TM: Basic bit wise calculator(+ /- /AND/OR) and Translator
		26/03/2019	University Question Papers solving
29/01/2019	Ambiguity Simplification and Normalization (CNF)	27/03/2019	University Question Papers solving
30/01/2019	Chomsky Hierarchy (Types 0 to 3)	30/03/2019	University Question Papers solving Doubt Clearing Session
11/02/2019	Push Down Automata :Deterministic (single stack) PDA		
12/02/2019	Push Down Automata :Deterministic (single stack) PDA		
18/02/2019	Equivalence between PDA and CFG.		
22/02/2019	Turing Machine Deterministic TM		

8. Tutorial Plan

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No of classes available:		No of Classes taken:		
Sr. No.	Topic Planned	Planned Date	Actual Date	Delivery Mechanisms
1	Finite State Machine	22/01/2019	22/01/2019	Chalk & Board
2	Regular Language	29/01/2019	29/01/2019	Chalk & Board
3	Moore and Mealy Machine	12/02/2019	12/02/2019	Chalk & Board
4	Context free Grammar	26/02/2019	26/02/2019	Chalk & Board
5	Context free Grammar	26/02/2019	26/02/2019	Chalk & Board
6	Push Down Automata	26/02/2019	26/02/2019	Chalk & Board
7	Push down automata	26/02/2019	26/02/2019	Chalk & Board
8	Pumping lemma	12/03/2019	12/03/2019	Chalk & Board
9	Turing Machine	19/03/2019	19/03/2019	Chalk & Board
10	Turing machine	26/03/2019	26/03/2019	Chalk & Board

9. Date wise lecture plan

Date	Topic Taught	Date	Topic Taught
22/01/2019	Finite State Machine	26/02/2019	Push Down Automata
29/01/2019	Regular Language	26/02/2019	Push down automata
12/02/2019	Moore and Mealy Machine	12/03/2019	Pumping lemma
26/02/2019	Context free Grammar	19/03/2019	Turing Machine
26/02/2019	Context free Grammar	26/03/2019	Turing machine