

SOCIETY OF ST. FRANCIS XAVIER, PILAR'S
FR. CONCEICAO RODRIGUES COLLEGE OF ENGINEERING

(Approved by AICTE & Affiliated to University of Mumbai)

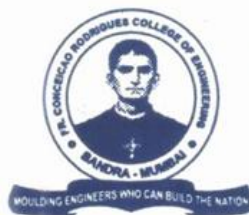
Fr. Agnel Ashram, Bandstand, Bandra (W), Mumbai - 400 050.

Phone : (022) 6711 4000, 6711 4101, 6711 4104

Website : www.frcrce.ac.in • Email : crce@fragnel.edu.in

Department of Computer Engineering (Academic Year :2023-2024)

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|---|---|
| Course Code: CSC501 (Div B) | |
| Course Name: Theoretical Computer Science | |
| Course Teacher: Mrs. Sangeeta Parshionikar | |
| Course Outcomes (CO): <i>At the End of the course students will be able to</i> | |
| CO.1 | Explain the concepts of finite automata in the context of Theoretical Computer Science. |
| CO.2 | Construct regular expressions (RE) for regular language and derive the equivalence of languages described by finite automata and regular expressions. |
| CO.3 | Design context free grammars to recognize the language. |
| CO.4 | Design Pushdown Automata to recognize the language. |
| CO.5 | Develop an understanding of different types Turing Machines and applications. |
| CO.6 | Determine decidability and undecidability of computational problems with fundamental understanding |
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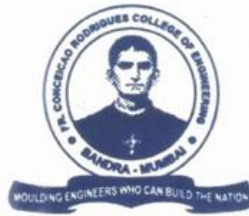
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Course Lesson Plan

| Sr. No. | Proposed Date | Actual Date | Topics | CO | Teacher's Remark | HoD's Remark |
|---------|---------------|-------------|---|-----|------------------|--------------|
| | | | Module No. 1 - Basic Concepts and Finite Automata | | | |
| 1 | 11-07-23 | | Importance of TCS, Course Outcomes | 1 | Online Lecture | |
| 2 | 13-07-23 | | Alphabets, Strings, Languages, Closure Properties. | 1,2 | Lecture | |
| 3 | 14-07-23 | | Finite Automata and Finite State Machine (Divide by 3 - FSM) | 1 | Lecture | |
| 4 | 18-07-23 | | DFA Definition, Transition Diagrams and Language recognizers examples | 1 | Online Lecture | |
| 5 | 20-07-23 | | DFA - Design problems | 1 | Lecture | |
| 6 | 21-07-23 | | NFA Definition and Design problems | 1 | Lecture | |
| 7 | 25-07-23 | | NFA to DFA conversion. | 1,2 | Lecture | |
| 8 | 27-07-23 | | NFA with e-transitions and NFA equivalence | 1,2 | Online Lecture | |
| 9 | 28-07-23 | | Minimization of DFA | 1,2 | Lecture | |
| 10 | 02-08-23 | | FSM with output: Moore Machine | 1 | Lecture | |
| 11 | 03-08-23 | | FSM with output: Mealy Machine | 1 | Lecture | |
| 12 | 04-08-23 | | Applications and Limitations of DFA | 1 | Lecture | |
| 13 | 09-08-23 | | Importance of TCS, Course Outcomes | 1,2 | Lecture | |
| | | | Module 2 - Regular Expressions and Languages | | Lecture | |
| 14 | 10-08-23 | | Regular Expressions, RE and FA equivalence | 1,2 | Assignment 1 | |
| 15 | 11-08-23 | | Arden's Theorem | 2 | Lecture | |
| 16 | 14-08-23 | | Regular Language (RL), Closure and decision properties of RL | 1,2 | Online Lecture | |
| | 15-08-23 | | Independence Day | | | |
| | 16-08-23 | | Parsi New Year | | | |



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|----|-------------------------|--|---|---|------------------------|--|
| 17 | 17-08-23 | | Pumping Lemma of RL | 2 | Flipped Class Activity | |
| 18 | 18-08-23 | | Pumping Lemma of RL | 2 | Assignment 2 | |
| | | | Module 3 - Grammars | | Lecture | |
| 19 | 23-08-23 | | Grammars and Chomsky hierarchy | 3 | Assignment 3 | |
| 20 | 24-08-23 | | Regular Grammar(RG), Left linear and Right linear Grammar | 3 | Lecture | |
| 21 | 25-08-23 | | Equivalence of RG and FA | 3 | Lecture | |
| | 29-08-23 to 31-08-23 | | Unit Test-1 | | | |
| 20 | 01-09-23 | | Context Free Grammar: Design | 3 | Lecture | |
| 21 | 06-09-23 | | Parse tree and Ambiguity | 3 | Quiz on Modules 2 & 3 | |
| 22 | 07-09-23 | | Chomsky Normal Form | 3 | Lecture | |
| 23 | 08-09-23 | | Greibach Normal Form | 3 | Lecture | |
| 24 | 13-09-23 | | CFLs- Pumping Lemma | 3 | Assignment 4 | |
| 25 | | | Module 4 - Pushdown Automata(PDA) | | Lecture | |
| | 14-09-23 | | Push Down Automata :Definition, transitions, Applications | 4 | Lecture | |
| 26 | 15-09-23 | | PDA-as generator, decider | 4 | Lecture | |
| | 19-09-23 to 22-09-23 | | Shri Ganesh Festival | | | |
| 27 | 27-09-23 | | PDA-as acceptor | 4 | Assignment 5 | |
| | 28-09-23 | | Anant Chaturdashi | | | |
| 28 | 29-09-23 | | Deterministic PDA | 4 | Lecture | |
| | | | Module 5 - Turing Machine (TM) | | | |
| | 04-10-23 | | Turing Machine: Definition, Transitions | 5 | Quiz 2 | |
| 29 | 05-10-23 | | Turing Machine as generator, decider | 5 | Lecture | |
| 30 | 06-10-23 | | Variants of Turing Machine, Universal TM | 5 | Lecture | |
| | 09-10-23 to 13-10-23 | | Unit Test-2 | | | |
| | | | Module 6 - Undecidability | | | |
| 31 | 16-10-23 | | Non-deterministic PDA, Decidability and Undecidability | 6 | Lecture | |



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| | | | | | Assignment 6 | |
| 32 | 19-10-23 | | Halting Problem, Recursive and Recursively Enumerable Languages | 6 | Lecture | |
| 33 | 20-10-23 | | Rice's Theorm, Post Correspondence Problem | 6 | Lecture | |
| | 30/10 | | Dashahera | | | |
| | 31/10 | | Course Exit Survey | | | |
| | 17-10-23 | | Remedial Session | | | |
| | | | University ESE Examination | | | |

Text Books:

1. John E, Hopcroft, Rajeev Motwani, Jeffery D. Ullman, "Introduction of Automata Theory, Languages and Computation, Pearson Edition
2. Michael Siper, "Theory of Computation", Cengage Learning
3. Vivek Kulkarni, :Theory of Computation", Oxford University Press. India

Reference Books:

1. J. C. Martin, " Introduction to languages and Theory of Computation", Tata McGraw Hill.
2. Kavi Mahesh, " Theory of Computation: A Problem Solving Approach", Wiley-India.

Course Instructor: Prof. Sangeeta Parshionikar