Birla Institute of Technology and Science, Pilani, Hyderabad Campus
First Semester 2024-25
Course Handout (Part-II)

Date: 01.08.2024

In addition to Part – I (General handout for all courses appended to the timetable) this portion further specific information regarding the course.

Course No.	:	CS F351
Course Title	:	Theory of Computation
Instructor-In-Charge	:	Dr.R. Gururaj
Instructors	:	Dr. Raghunath Reddy and Dr. Sameera Muhamed Salam.

1. Scope of the Course:

The scope of this course includes- Languages; Finite automata and regular languages- Regular Expressions, Deterministic and Non-deterministic FA, Conversion from NDFA to DFA, Pumping theorem; Context free languages and CFGs- Push down automata, concepts in parsing, parse trees, Top-down and Bottom-up parsing; Turing machines; Universal Turing Machines; Computability –decidability and semi-decidability, recursive languages, Church-Turing hypothesis; Undecidable problems – the halting problem.

2. Course Objectives:
- To provide a theoretical foundation for the process of computations performed by computers by studying Automata concepts.
- To impart an understanding of the notions of automata, formal languages, Grammars, and parsing.
- To understand the practical applications of automata in various applications like Compilers etc.
- To understand the capabilities and limitations of computing machines.

3. Textbook:

T1. Elements of Theory of Computation, Harry Lewis and Christos Papadimitriou, Second Edition, PHI, Asia 1998

4. **Detailed Lecture Schedule:**

Lect. No.	Learning Objective	Topics Covered	Reading
1	To provide an overview of the course and its importance	Introduction to Theory of Computations	-
2-3	To have a recap of concepts of Set theory related to Automata Theory	Set theory	T1 Ch. 1
4-5	To understand the concepts in Language representation	Alphabets and languages	T1 Ch. 1
6		Finite representation of languages	T1 Ch. 1
7-9	To provide a comprehensive understanding about the theory and working of Finite automata and its applications	Finite automata	T1 Ch. 2
10-12		Deterministic & Non-deterministic finite automata	T1 Ch. 2
13-14		Finite automata & regular expressions	T1 Ch. 2
15-17		State minimization	T1 Ch. 2
18-20	To learn the theory behind the Context-free languages, Context –free Grammars and related automata and their applications in compilation	Context-free grammars	T1 Ch. 3
21-24		Parse trees	T1 Ch. 3
25-29		Pushdown automata	T1 Ch. 3
30-33	To understand the theory and working of Turing Machines	Turing machines	T1 Ch. 4
34-35		Non-deterministic Turing machines	T1 Ch. 4
36-38		Undecidability, Universal TMs	T1 Ch. 5
39	To provide an overview of classes of computational problems	Unsolvable problems	T1 Ch. 5
40		Computational complexity	T1 Ch. 6
41		N-P Completeness	T1. Ch.7
42		Conclusion.	

5. Evaluation Scheme:

S No	Evaluation Component	Weightage	Duration in Mins	Date & Time	Nature of Component
1	Quiz-1 (before Mid-sem grading)	10%	30-40	14/09/2024 FN	Open Book
2	Mid-semester Test	35%	90	03/10 - 11.30 - 1.00PM	Close Book
3	Quiz-2 (after Mid-sem)	10%	30-40	16/11/2024 FN	Open Book
4	Comprehensive Exam	45 %	180	02/12 AN	Close Book

6. **Make-up-Policy:** Make-up (excepting Compre) may be given for genuine cases with prior permission by IC, and after rigorous scrutiny. For Comprehensive exam, make-up has to be approved and scheduled by AUGSD.

7. **Course Notices:**

All notices pertaining to this course will be displayed on CMS Course webpage.

8. **Consultation:** Will be announced in the classroom.

9. **Academic Honesty and Integrity Policy**: Academic honesty and integrity are to be maintained by all the students throughout the semester and no type of academic dishonesty is acceptable.

Instructor In-charge
CS F351