BANGALORE INSTITUTE OF TECHNOLOGY
K. R. Road, V. V. Puram, Bengaluru-560 004

DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

COURSE LESSON PLAN - V SEM 2022-23 (Odd)
Batch: 2020-2024 CBCS

Course Title : Automata Theory & Computability　　　**Course Code : 18CS54**
Number of Contact Hours/Week : 03　　　　　　　　**Exam Hours : 03**
Total Number of Contact Hours : 40　　　　　　　　**Exam Marks : 60**

Automata theory is closely related to formal language theory. An automaton is a finite representation of a formal language that may be an infinite set. Automata are often classified by the class of formal languages they can recognize, typically illustrated by the Chomsky hierarchy, which describes the relations between various languages and kinds of formalized logics. Automata play a major role in theory of computation, compiler construction, artificial intelligence, parsing and formal verification.

Hour	Date	Topic to be covered	Levels
Module - 1			
1	01/10/2021	Introduction, CLOs & COs	L1,L2
2	05/10/2021	Strings, Languages, A Language Hierarchy, Computation	L1,L2
3	07/10/2021	Deterministic FSM, Regular languages	L2
4	08/10/2021	Designing FSM	L3
5	12/10/2021	Designing FSM	L3
6	21/10/2021	Nondeterministic FSMs	L3
7	22/10/2021	From FSMs to Operational Systems, Simulators for FSMs	L3
8	26/10/2021	Minimizing FSMs, Canonical form of Regular languages	L2,L3
9	28/10/2021	Finite State Transducers, Bidirectional Transducers	L2,L3
Module - 2			
10	29/10/2021	Regular Expressions (RE): what is a RE?	L2
11	02/11/2021	Kleene's theorem	L2
12	04/11/2021	Applications of REs	L2
13	09/11/2021	Manipulating and Simplifying REs	L3

14	11/11/2021	Regular Grammars: Definition, Regular Grammars and Regular languages	L2
15	12/11/2021	Regular Languages (RL) and Non-regular Languages: How many RLs?	L2
16	18/11/2021	To show that a language is regular	L3
17	19/11/2021	Closure properties of RLs	L2
18	23/11/2021	To show some languages are not RLs	L3
Module - 3			
19	25/11/2021	Introduction to Rewrite Systems and Grammars, CFGs and languages	L2
20	26/11/2021	Designing CFGs, Simplifying CFGs, Proving that a Grammar is correct	L3
21	30/11/2021	Derivation and Parse trees, Ambiguity	L2,L3
22	02/12/2021	Normal Forms	L2,L3
23	03/12/2021	Pushdown Automata (PDA): Definition of non-deterministic PDA	L2,L3
24	07/12/2021	Deterministic and Nondeterministic PDAs	L2,L3
25	09/12/2021	Non-determinism and Halting	L2
26	10/12/2021	Alternative equivalent definitions of a PDA	L2,L3
27	14/12/2021	Alternatives that are not equivalent to PDA	L2,L3
Module - 4			
28	16/12/2021	Algorithms and Decision Procedures for CFLs: Decidable questions, Un-decidable questions	L2
29	17/12/2021	Turing Machine: Turing machine model, Representation	L2
30	23/12/2021	Language acceptability by TM	L2
31	24/12/2021	Design of TM	L3
32	28/12/2021	Design of TM	L3
33	30/12/2021	Techniques for TM construction	L3
34	31/12/2021	Variants of Turing Machines (TM)	L2,L3
35	04/01/2022	The model of Linear Bounded automata	L2
Module - 5			
36	06/01/2022	Definition of an algorithm, decidability, decidable languages, Undecidable languages	L2
37	07/01/2022	Halting problem of TM	L2,L3

38	11/01/2022	Post correspondence problem	L2
39	13/01/2022	Complexity: Growth rate of functions	L2
40	18/01/2022	The classes of P and NP	L2
41	25/01/2022	Quantum Computation: quantum computers	L2
42	27/01/2022	Church-Turing thesis	L2
43	28/01/2022	Applications: G.1 Defining syntax of programming language Appendix J: Security	L2

Text Books:

1. Elaine Rich, Automata, Computability and Complexity, 1st Edition, Pearson Education, 2012/2013.
2. K L P Mishra, N Chandrasekaran , 3rd Edition, Theory of Computer Science, PhI, 2012.

Reference Books:

1. John E Hopcroft, Rajeev Motwani, Jeffery D Ullman, Introduction to Automata Theory, Languages, and Computation, 3rd Edition, Pearson Education, 2013.
2. Michael Sipser : Introduction to the Theory of Computation, 3rd Edition, Cengage learning, 2013.
3. John C Martin, Introduction to Languages and The Theory of Computation, 3rd Edition, Tata McGraw –Hill Publishing Company Limited, 2013.
4. Peter Linz, "An Introduction to Formal Languages and Automata", 3rd Edition, Narosa Publishers, 1998.
5. Basavaraj S. Anami, Karibasappa K G, Formal Languages and Automata theory, Wiley India, 2012.
6. C K Nagpal, Formal Languages and Automata Theory, Oxford University press, 2012.

Faculty In-charge

Course Coordinator   Module Coordinator   IQAC   Programme Coordinator