

Paper Name: Theory of Computations

Session: August 2022 to December 2022 Semester: 3

Paper Code: CSC-3016 LTP-420

Day	Unit	Topics
1	Revision of basic concepts	Review of Finite Automata, DFA, acceptance of languages by DFA
2		Extension to NFA and NFA with empty moves
3		Working examples of DFA and NFA - I
4		Working examples of DFA and NFA - II
5		Review of Regular Expressions and examples.
6	I	Definition of Pushdown Automaton (PDA), Instantaneous description
7	I	Pushdown Automaton as language acceptor. Working examples
8	I	Working Examples on design of PDA - I
9	I	Working Examples on design of PDA - II
10	I	Equivalence of acceptance with final state and empty stack - I
		Equivalence of acceptance with final state and empty stack - II
11	I	Deterministic PDA and language accepted by it.
12	I	Equivalence of PDA's and Context free languages - I
13	I	Equivalence of PDA's and Context free languages - II
14	I	Relation of Pushdown Automaton with Finite State Automata.
15	I	Pumping lemma for CFL's and its proof
16	I	Applications of Pumping Lemma
17	I	Closure properties of CFL's. - I
18		Closure properties of CFL's - II
19		Decision properties of CFL's - I
20		Decision properties of CFL's - I
21	II	Turing Machine-Definition, ID of TM, Acceptance of Languages, Recursively Enumerable and Recursive Languages
22	II	Design of Turing Machines - I
23	II	Design of Turing Machines - II
24	II	Design of Turing Machines - III
25	II	TMs as function computers with Examples - I
26	II	TMs as function computers with Examples - II

27	II	Other Models of TMs - TM with stay option and equivalence with the Standard Turing Machine (STM)
28	II	TM with semi- infinite tape and equivalence with the Standard Turing Machine (STM)
29	II	Multi-Tape TM and equivalence with the Standard Turing Machine (STM)
30	II	Multi-Head TM and Multi- Dimensional TM and equivalence with the Standard Turing Machine (STM)
31	II	Non-deterministic TM and equivalence with the Standard Turing Machine (STM)
32	III	Properties of recursively and recursive languages - I
33	III	Properties of recursively enumerable and recursive languages - II
34	III	Binary encoding of TMs
35		UTM, Church-Turing Thesis
36	III	Decidable and Undecidable Problems. Rice's Theorem and Applications,
37	IV	Left and Right linear grammar and relation with Regular Sets - I
38		Left and Right linear grammar and relation with Regular Sets - II
39	IV	Unrestricted grammars and TM.
40		Equivalence of Unrestricted grammars and TM
41		Context-sensitive languages and Linear Bounded Automata - I
42		Context-sensitive languages and Linear Bounded Automata - II
43	IV	Languages that are not r.e. and associated theorems - I
44		Languages that are not r.e. and associated theorems - II
45	IV	Relation between CSL and r.e language
46	IV	Chomsky Hierarchy
47	IV	Halting Problem for TM, Examples of Undecidable Problems
48		Rice's Theorem and its applications