

RAJIV GANDHI PROUDYOGIKI VISHWAVIDYALAYA, BHOPAL
PROGRAMME: B.E. Computer Science & Engineering, V Semester
Course: CS 505 Theory of Computation
Course Contents

Category of Course	Course Title	Course Code	Credit-4C			Theory Paper (ES)
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Departmental Core DC-11	Theory of Computation	CS 5511/ CS505	3	1	0	Max.Marks-100 Min.Marks-35 Duration-3hrs.

Branch: Computer Science and Engineering V Semester
Course: CS 505 Theory of Computation

RATIONALE:

The purpose of this subject is to cover the underlying concepts and techniques used in Theory of Computation. In this syllabus we cover finite automata, pushdown automata, Context free grammars and Turing machines.

PREREQUISITE:-

The students should have general idea about computing and mathematical concepts , Transition graph, Transition matrix .

UNIT 1:

Automata:

Basic machine, FSM , Transition graph, Transition matrix, Deterministic and non-deterministic FSM'S, Equivalence of DFA and NFA, Mealy & Moore machines, minimization of finite automata, Two-way finite automata.

Regular Sets and Regular Grammars:

Alphabet, words, Operations, Regular sets, Finite automata and regular expression, Myhill-Nerode theorem Pumping lemma and regular sets, Application of pumping lemma, closure properties of regular sets.

UNIT 2:

Context –Free Grammars:

Introduction to CFG, Regular Grammars, Derivation trees and Ambiguity, Simplification of Context free grammars, Normal Forms (Chomsky Normal Form and Greibach Normal forms).

UNIT 3:

Pushdown Automata:

Definition of PDA, Deterministic Pushdown Automata, PDA corresponding to given CFG, CFG corresponding to a given PDA.

Context Free Languages:

The pumping lemma for CFL's, Closure properties of CFL's, Decision problems involving CFL's.

UNIT 4:

Turing Machines:

Introduction, TM model, representation and languages acceptability of TM Design of TM, Universal TM & Other modification, Church's hypothesis, composite & iterated TM. Turing

machine as enumerators. Properties of recursive & recursively enumerable languages, Universal Turing machine

UNIT 5:

Tractable and Untractable Problems:

P, NP, NP complete and NP hard problems, examples of these problems like satisfy ability problems, vertex cover problem, Hamiltonian path problem, traveling sales man problem, Partition problem etc.

Suggested Reading:

1. John E. Hopcroft, Jeffery Ullman, "Introduction to Automata theory, Languages & computation", Narosa Publishers.
2. K.L.P Mishra & N.Chandrasekaran, "Theory of Computer Science", PHI Learning
3. Michael Sipsev, "Theory of Computation", Cenage Learning
4. John C Martin, "Introduction to languages and theory of computation", McGraw Hill
5. Daniel I.A. Cohen, "Introduction to Computer Theory", Wiley India.
6. Kohavi, "Switching & Finite Automata Theory", TMH