RAJIV GANDHI PROUDYOGIKI VISHWAVIDYALAYA, BHOPAL

New Scheme Based On AICTE Flexible Curricula

Artificial Intelligence and Data Science, V-Semester

AD-501 Theory of Computation

COURSE OBJECTIVES:

This course will help students to learn several formal mathematical models of computation along with their relationships with formal languages and grammars. Students will also learn about solvable and unsolvable problems.

COURSE OUTCOMES:

After completing the course student should be able to:

1. Compare and analyze different theoretical computational models, languages and grammars.
2. Design and construct finite automata, pushdown automata and Turing machine for various problems.
3. Identify limitations of some computational models and possible methods of proving them.
4. Describe the concept of computable and non-computable problems.

Unit-I
Introduction of Automata Theory: Review of Sets, Mathematical formal proofs including proof by induction and by contradiction,Introduction to languages, grammars and automata: Alphabet, Representation of language and grammar, Types of Automata, Finite Automata as a language acceptor and translator, Moore machines and mealy machines, composite machine, Conversion from Mealy to Moore and vice versa.

Unit-II
Types of Finite Automata: Non Deterministic Finite Automata (NDFA), Deterministic finite automata machines, conversion of NDFA to DFA, minimization of automata machines, regular expression, applications of regular expressions, Arden's theorem. Meaning of union, intersection, concatenation and closure, 2 way DFA.

Unit-III
Grammars: Types of grammar, context sensitive grammar, and context free grammar, regular grammar. Derivation trees, ambiguity in grammar, simplification of context free grammar,conversion of grammar to automata machine and vice versa, Chomsky hierarchy of grammar, Chomsky normal form and Greibach normal form.