|  |  |  |  |
| --- | --- | --- | --- |
| **FORMAL LANGUAGES AND AUTOMATA THEORY**  **[ Revised Credit System ]**  **(Effective from the academic year 2018-19)**  **SEMESTER - IV** | | | |
| **Subject Code** | **CSE 2254** | **IA Marks** | **50** |
| **Number of Lecture Hours/Week** | **03** | **Exam Marks** | **50** |
| **Total Number of Lecture Hours** | **36** | **Exam Hours** | **03** |
| **CREDITS - 03** | | | |
| **Course objectives:** This course will enable students   * Understand the mathematical meaning of Grammar * Know how to generate Languages using grammars * Design Automata for various languages | | | |
| **Module -1** | | | **Teaching Hours** |
| **INTRODUCTION TO THE THEORY OF COMPUTATION AND FINITE AUTOMATA:**  Three basic concepts, Some Applications, Deterministic Finite Accepters, Nondeterministic Finite Accepters, Equivalence of Deterministic and Nondeterministic Finite Accepters, Reduction of the Number of States in Finite Automata.  **Text Book 1**: Chapter 1:1.2 - 1.3, Chapter 2: 2.1 - 2.4 | | | **08 Hours** |
| **Module -2** | | | |
| **REGULAR LANGUAGES, REGULAR GRAMMARS AND PROPERTIES OF REGULAR LANGUAGES:**  Regular Expressions, Connection between Regular Expressions and Regular Languages, Regular Grammars, Closure Properties of Regular Languages, Identifying Non-regular Languages.  **Text Book 1:** Chapter 3: 3.1 -3.3,Chapter 4: 4.1, 4.3 | | | **07 Hours** |
| **Module - 3** | | | |
| **CONTEXT-FREE LANGUAGES AND SIMPLIFICATION OF CONTEXT-FREE GRAMMARS AND NORMAL FORMS:**  Context-Free grammars, Parsing and Ambiguity, Context-Free Grammars and programming languages, Methods for Transforming Grammars, Two important Normal Forms.  **Text Book 1:** Chapter 5: 5.1 -5.3, Chapter 6: 6.1 – 6.2 | | | **07 Hours** |
| **Module-4** | | | |
| **PUSHDOWN AUTOMATA AND PROPERTIES OF CONTEXT-FREE LANGUAGES:**  Nondeterministic Pushdown Automata, Pushdown Automata and Context–Free Languages, Deterministic Pushdown Automata and Deterministic Context-Free Languages, Two Pumping Lemmas, Closure properties and Decision Algorithms for Context-Free Languages.  **Text Book 1:** Chapter 7: 7.1 – 7.3, Chapter 8: 8.1 -8.2 | | | **06 Hours** |
| **Module-5** | | | |
| **TURING MACHINES AND OTHER MODELS OF TURING MACHINES:**  The Standard Turing Machine, Nondeterministic Turing Machines, Linear Bounded Automata.    **A HIERARCHY OF FORMAL LANGUAGES & AUTOMATA**  Recursive and Recursively Enumerable Languages, Unrestricted grammars, Context-Sensitive Grammars and Languages, The Chomsky Hierarchy.  **Text Book 1:** Chapter 9: 9.1, Chapter 10:10.3, 10.5, Chapter 11: 11.1-11.4 | | | **08 Hours** |
| **Course outcomes:** | | | |
| After studying this course, students will be able to:   1. Understand various applications of Grammars, Languages and Automata 2. Design Grammars, Languages and Automata for various computational problems. | | | |
| **Text Books:**   1. Peter Linz, *An Introduction to Formal Languages and Automat*, (6e), Jones & Bartlett Learning, 2016. | | | |
| **Reference Books:**   1. John C Martin, *Introduction to Languages and the Theory of Computation*, (3e), McGraw Hill, India, 2007. 2. J E Hopcroft, Rajeev Motwani & Jeffrey D Ullman, *Introduction to Automata Theory, Languages and Computation*, (3e), Pearson Education, 2006. 3. K.L.P. Mishra, N.Chandrashekharan, *Theory of Computer Science*, (3e), PHI publications, 2007. 4. Michael Sipser, *Theory of Computation*, Cengage Learning, 2007. | | | |