

Course Title: **Theory of Computation**  
 Course Code: COM-603.3  
 Administration: Second Semester  
 Duration: One Semester  
 Class Load: 5 Hrs. per Week (Theory: 3 Hrs., Tutorial: 2 Hrs.)  
 Pre-requisite: MFCS

**Evaluation:**

	Theory	Practical	Total
Sessional	50	-	50
Final	50	-	50
Total	100	-	100

**Course Objective:**

To understand the concepts that is used to model and predict the behavior of all those computing activities that involve the manipulation of symbols. Areas like Compiler, Communication Protocols, Operating Systems, Optimization, Databases etc.

**Course Contents:**

1. **Introduction** **(3 hrs)**  
Some computing puzzles, understanding computability.
  
2. **Languages** **(10 hrs)**  
Symbols, Alphabets and Strings, Languages, Operation on Languages, Alphabet encoding, Problem representation, Types of problem (Representing Graphs, Spanning Tree, Decision Problem, Function Problem and Search Problem), Casting Problems into Languages, Regular Language, Regular Expression, Application of Regular Expression.
  
3. **Finite State Machines and Languages** **(8 hrs)**  
Church –Turing Thesis, Basic Machine Notions, DFA, NFA, Equivalence, Properties of Finite State Languages, Pumping Lemma for Regular Language, Application of Pumping Lemma.
  
4. **Stack and Tape machines** **(8 hrs)**  
Push Down Automata, Turing Machines, Undecidable Languages, Grammars: Regular and Context Free, Parsing, Parse Tree and Attribution.
  
5. **Computational Complexity Theory** **(8 hrs)**  
Introduction, Asymptotic Notation, Time and Space Complexity, Reducibility, Introduction to Circuit Complexity. Complexity Class NC.
  
6. **Feasible and Intractable Problems** **(8 hrs)**  
Polynomial Time, p-Completeness Theory and Problems, Reduction, *np*-Completeness Theory and Problems, Reduction.

**Reference Books :**

1. Lewis H.R. and C.H. Papadimitrious, Elements of the theory of computation, 1998, Pearson Education.
2. Cohesn Daniel, I.A., Introduction to computer theory, 2E, 2000, John Woley and sons (Asia) Pvt. Ltd. Singapore.

3. Mishra, K.L.P. and Chandrasekhar, N., *Theory of Computer Science*, PHI, New Delhi, 1998.
4. Hopcroft, J.E. and Ulman, J.D., *Introduction to Automata Theory, Languages and Computation*, Narosa Publishing House, New Delhi.