

## Approval: OTA in 4<sup>th</sup> Convocation

**Course Name:** Automata Theory  
**Course Code:** CS 304  
**Credit:** 3-0-0-3  
**Category:**  
**Prerequisites:** Discrete Mathematics

### **Course contents:**

Regular languages - Regular expressions, DFA, NFA, Myhill-Nerode theorem, pumping lemma, closure properties.

Grammars - Production systems - Right linear grammar and Finite state automata - Context free grammars - Normal forms - uvwxy theorem - subfamilies of CFL - Derivation trees and ambiguity.

Pushdown automata - Acceptance by empty store and final state - Equivalence between push-down automata and context-free grammars - Closure properties of CFL - Deterministic push-down automata.

Turing machines - Techniques for Turing machine construction - Generalized and restricted versions equivalent to the basic model - Universal Turing machine - Recursively enumerable sets and recursive sets

Decidability; Post's correspondence problem; Rice's theorem; decidability of membership, emptiness and equivalence problems of languages.

### **Text Books**

1. J. E. Hopcroft, R. Motwani and J. D. Ullman, "Introduction to automata theory, languages and computation", Pearson Education Asia, 2001

### **References**

2. Peter Linz, "An introduction to formal language and automata", 3rd edition, Narosa publishing house, 2002.
3. H. R. Lewis and C.H. Papadimitriou, "Elements of the theory of computation", Prentice Hall International Editions, 1981.