# Discrete Mathematics

Course Code: CIT104
Year : 1
Semester : II
Credit Hour: (3TH + 0PR)

## Course Objectives:

The purpose of the course is to provide fundamental knowledge of discrete structure. This course aims to introduce basic discrete structures, Logic, Reasoning, Algorithms, Recurrence Relation, Graph theory and theory of Automata. Also, it intends to provide fundamental knowledge in discrete Mathematics, Finite state Automata and graph in an Algorithmic approach.

## Course Content:

1. **Logic and Induction:** **8hrs**
   Proposition and Truth Functions; Propositional logic, Predicates and Quantification; Expression statement in the Language of logic; Deduction in Predicate Logic; Introduction to Induction

2. **Mathematical Reasoning:** **6hrs**
   Axioms; Rule of Inference and Proofs; Direct proof and Indirect Proofs

3. **Finite state Automata, Grammars and Languages:** **8hrs**
   Sequential circuit, Finite State Machines (FSM) and Finite State Automata(FSA); Alphabets, Language and Grammars; Non-Deterministic Finite State Automata(FSA), Conversion of NonDeterministic FSA to Equivalent FSA

4. **Recurrence Relation:** **8hrs**
   Introduction, Differencing and summation; Solution of Linear Recurrence Relations; Solution of Non-Linear Recurrence Relations

5. **Graph Theory:** **15hrs**
   Definitions, Undirected and Directed Graphs; Walk, Path, Circuit, Components; Introduction to Complete Graph, Bipartite Graph, Regular Graph, Hamiltonian Graph, Euler Graph, Planar Graph; Computer Representation of Graphs; Shortest path Algorithm, Isomorphic of Graphs; Concept of graph coloring, Application of Graph Theory in Computer Science

## References Books:


1. Richard Johnsonbaugh, *Discrete Mathematics*, Fifth Edition, Addison Wesley, Pearson Education Asia (LPE), ISBN: 81-780-82799, 2000

2. Kenth Rosen, *Discrete Mathematics Structures with Applications to Computer Science*, WCB/ McGraw Hill

3. Joe L. Mott, Abrahan Kandel, and Theodora P. Baker, *Mathematics Structures for Computer Scientists and Mathematicians*, Second Edition, Prentice-Hall of India, ISBN: 81-203-1502-2