# VISHNU INSTITUTE OF TECHNOLOGY:: BHIMAVARAM

## (AUTONOMOUS)

**Approved by AICTE, Accredited by NAAC-A++, NBA & Affiliated to JNTUK, Kakinada**

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| **Year/Semester** | **II B. Tech/ I Sem** | **L** | **T** | **P** | **C** |
| **Regulation Year** | **2020-21** | **3** | **0** | **-** | **3** |
| **Subject** | **DISCRETE MATHEMATICAL STRUCTURES** | | | | |
| **Branch** | **AI&ML, AI& DS, IT** | | | | |

# Course Objectives:

* Check the validity of arguments by using basic connective and valid rules of inference.
* Observe various properties of sets and relations.
* Identify different graphs, isomorphism of graphs, paths, cycles and circuits.
* Identify different types of trees.
* To introduce recurrence relations.

**UNIT I:** Mathematical Logic:Propositional Calculus: Statements and Notations, Connectives, Truth Tables, Tautologies, Equivalence of Formulas, Duality law, Tautological Implications, Normal Forms, Theory of Inference for Statement Calculus, Consistency of Premises, Indirect Method of Proof. Predicate calculus: Predicative Logic, Statement Functions, Variables and Quantifiers, Inference theory for predicate calculus.

**UNIT II:** Set Theory:Introduction, Operations on Binary Sets. Relations: Properties of Binary Relations, Relation Matrix and Digraph, Operations on Relations, Partition and Covering, Transitive Closure, Equivalence, Compatibility and Partial Ordering Relations, Hasse Diagrams.

Functions:Bijective Functions, Composition of Functions.

## UNIT III: Graph Theory I:

Basic Concepts of Graphs, Sub graphs, Matrix Representation of Graphs: Adjacency Matrices, Incidence Matrices, Isomorphic Graphs, Paths and Circuits, Eulerian and Hamiltonian Graphs, Multigraphs, (Problems and Theorems without proofs).

## UNIT IV: Graph Theory II:

Planar Graphs, Euler’s Formula, Graph Colouring and Covering, Chromatic Number, (Problems and Theorems without proofs).

Trees, Directed trees, Binary Trees, Spanning Trees: Properties, Algorithms for Spanning trees and Minimum SpanningTrees.

**UNIT V: Recurrence Relations:** Generating Functions, Calculating Coefficient of Generating Functions, Recurrence Relations, Formulation as Recurrence Relations, Solving Recurrence Relations by Substitution and Generating Functions, Method of Characteristic Roots, Solving Inhomogeneous Recurrence Relations.

## TEXT BOOKS:

1. Discrete Mathematical Structures with Applications to Computer Science, J. P. Tremblay and P. Manohar, Tata McGraw Hill.
2. Elements of Discrete Mathematics-A Computer Oriented Approach, C. L. Liu and D. P. Mohapatra, 3rdEdition, Tata McGraw Hill.
3. Discrete Mathematics and its Applications with Combinatorics and Graph Theory, K.

H. Rosen, 7th Edition, Tata McGraw Hill.

## REFERENCE BOOKS:

1. Discrete Mathematics for Computer Scientists and Mathematicians, J. L. Mott, A. Kandel,

T.P. Baker, 2nd Edition, Prentice Hall of India.

1. Discrete Mathematical Structures, BernandKolman, Robert C. Busby, Sharon Cutler Ross, PHI.
2. Discrete Mathematics, S. K. Chakraborthy and B.K. Sarkar, Oxford, 2011.

# Course Outcomes:

1. Ability to apply mathematical logic to solve problems.
2. Understand sets, relations, functions and discrete structures
3. Apply graph theory concepts to modeling problems in Computer Science using graphs.
4. Apply graph theory concepts to modelling problems in Computer Science using trees.
5. Solve different recurrence relations.