



# SRINIVASA RAMANUJAN INSTITUTE OF TECHNOLOGY

(Affiliated to JNTUA & Approved by AICTE | Accredited by NAAC with A Grade |  
Accredited by NBA (ECE, EEE, CSE))

Rotarypuram Village, B K Samudram Mandal, Ananthapur - 515701.

Department of Computer Science & Engineering

Course Title:	Discrete Mathematics				Course Code:	R204GA05401
Class & Sem:	II B. Tech II Sem				Regulations:	SRIT R20
Course Structure:	Theory	Tutorial	Lab	Credits	Core/Elective:	Core
	3	0	0	3		
Instructor 1:	Mr. M. Narasimhulu			Instructor 2:		
AY:2022-23						

**1. Prerequisites:** A higher education mathematics is required to study this course.

**2. Course Description:** This course will introduce and illustrate in the elementary discrete mathematics for computer science and engineering students. To equip the students with standard concepts like formal logic notation, methods of proof, induction, sets, relations, graph theory, permutations and combinations, counting principles.

### 3. Detailed Syllabus:

#### UNIT 1:

(11 Periods)

**Mathematical Logic:** Propositional Calculus: Statements and Notations, Connectives, Well Formed Formulas, 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, Free and Bound Variables, Inference Theory for Predicate Calculus.

#### UNIT 2:

(15 Periods)

**Set Theory:** Introduction, Operations on Binary Sets, Principle of Inclusion and Exclusion, 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, Inverse Functions, Permutation Functions, Recursive Functions, Lattice and its Properties.

#### UNIT 3:

(14 Periods)

**Algebraic Structures and Number Theory:** Algebraic Structures: Algebraic Systems, Examples, General Properties, Semi Groups and Monoids, Homomorphism of Semi Groups and Monoids, Group, Subgroup, Abelian Group, Homomorphism, Isomorphism.

**Number Theory:** Properties of Integers, Division Theorem, The Greatest Common Divisor, Euclidean Algorithm, Least Common Multiple, Testing for Prime Numbers, The Fundamental Theorem of Arithmetic, Modular Arithmetic (Fermat's Theorem and Euler's Theorem).

#### UNIT 4:

(11 Periods)

**Combinatorics:** Basic of Counting, Permutations, Permutations with Repetitions, Circular Permutations, Restricted Permutations, Combinations, Restricted Combinations, Generating Functions of Permutations and Combinations, Binomial and Multinomial Coefficients, Binomial and Multinomial Theorems, The Principles of Inclusion-Exclusion, Pigeonhole Principle and its Application.

#### UNIT 5:

(11 Periods)

**Graph Theory:** Basic Concepts of Graphs, Sub graphs, Matrix Representation of Graphs: Adjacency Matrices, Incidence Matrices, Isomorphic Graphs, Paths and Circuits, Eulerian and Hamiltonian Graphs, Multigraphs, Planar Graphs, Euler's Formula, Graph Coloring and Covering, Chromatic Number, Spanning Trees, Algorithms for Spanning Trees.

**Total Periods: 62**

### 4. Text Books :

- Discrete Mathematical Structures with Applications to Computer Science, J. P. Tremblay and P. Manohar, Tata McGraw Hill, 2015.
- Elements of Discrete Mathematics-A Computer Oriented Approach, C. L. Liu and D. P. Mohapatra, 3rd Edition, Tata McGraw Hill, 2008.

## 5. Reference Books :

1. Advanced Engineering Mathematics, by Erwin Kreyszig, 10<sup>th</sup> Edition, Wiley India, 2014.
2. Higher Engineering Mathematics, by B.V.Ramana, Sixth Reprint, Mc Graw Hill publishers, 2008.
3. Advanced Engineering Mathematics, by Alan Jeffrey, 1<sup>st</sup> Edition, Elsevier, 2010.

## 6. Course Outcomes

On successful completion of this course the students will be able to

S. No.	Course Outcome	Cognitive Level
1	Illustrate discrete mathematic components like statements, logic, sets, structures, numbers and combinatorics.	Understand
2	Evaluate and simplify propositional and predicate calculus using inference theory.	Apply
3	Perform the operations on Sets, Relations and functions and their properties.	Apply
4	Identify algebraic systems and use general properties on number theory.	Apply
5	Use combinatorics solving the counting problems.	Apply
6	Use graph algorithms for representing, identifying, generating and evaluating the Graphs.	Apply

## 7. Additional Topics:

Sr. No.	Topic	Course Outcome
1	Mathematical Induction	C06
2	Recurrence Relations	C06

## 8. Course Assessment & Evaluation:

Mode of assessment	Frequency	Marks
Mid-Term Examinations (Internal)	Twice (80% weightage to the better mid exam and 20% to the other) Mid 1: cover topics connected with C01, C02 & C03 Mid 2: cover topics connected with C04, C05 & C06	30
University Examinations (External)	Once Covers topics connected with all CO's	70
Total		100

## 9. Mapping(X) of Course Outcomes with Program Outcomes & Program Specific Outcomes:

CO/PO	P01	P02	P03	P04	P05	P06	P07	P08	P09	P010	P011	P012	PS01	PS02		PS03
C01													X			
C02	X												X			
C03	X												X			
C04	X												X			
C05	X												X			
C06	X												X			

Course Instructor

HOD