



**GITAM INSTITUTE OF MANAGEMENT (GIM)**  
**Gandhi Institute of Technology and Management (GITAM)**  
**(Declared as Deemed to be University u/s 3 of UGC Act. 1956)**  
**Visakhapatnam – 45.**

<b>Course Code: MAN 108</b>	<b>Course Title: Discrete Mathematics</b>	
<b>Semester: II</b>	<b>Course Type: Core</b>	<b>Credits: 4</b>
<b>Home Programme(s): BBA(BA)</b>	<b>Batch/Academic Year: 2020-2023</b>	
<b>Course Leader:</b>		

### Course description and learning objectives

To introduce the students to the topics and techniques of discrete methods and combinatorial reasoning. To introduce a wide variety of applications. The algorithmic approach to the solution of problems is fundamental in discrete mathematics, and this approach reinforces the close ties between this discipline and the area of computer science.

### Learning objectives:

- Complete and use truth tables for expressions involving the following logical connectives: negation, conjunction, disjunction, conditional, and bi conditional.
- Understand and use the terms cardinality, finite, countably infinite, and uncountably infinite, and determine which of these characteristics is associated with a given set.
- Solve counting problems involving the multiplication rule, permutations, and combinations (with and without replacement). Use standard notation.
- Show that a binary relation on a set is an equivalence relation, or give a counterexample to show that it is not.
- Understand and use many terms associated with a simple and directed graphs .

On successful completion of this course, students will be able to:

	<b>Course Outcomes</b>	<b>Assessment</b>
CO1	Understanding to demonstrate skills in solving mathematical problems	A1,A3
CO2	Apply to comprehend mathematical principles and logic	A1,A3,
CO3	Analyze to demonstrate knowledge of mathematical modeling and proficiency in using mathematical software	A2,A3,
CO4	Evaluate to communicate effectively mathematical ideas/results verbally or in Writing	A2,A3,
CO5	Create an edge for the business	A3, A4

### Course outline and indicative content

#### Unit – I (13 sessions) (CO1, CO2, L2, L3)

**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, Predicate Calculus: Predicative Logic, Statement Functions, Variables, Free and Bound Variables,

#### Unit – II (12 sessions) (CO2, CO3, CO4, L2, L3, L4)

**Set Theory:** Introduction, Operations on Binary Sets, Principle of Inclusion and Exclusion, *Relations:* Properties of Binary Relations, Relation Matrix , Operations on Relations, Partition and Covering,

Transitive Closure, Equivalence, Compatibility and Partial Ordering Relations, Hasse Diagrams, *Functions*: Bijective Functions, Composition of Functions, Inverse Functions.

**Unit – III (11 sessions) (CO2, CO3, CO4, L3, L4, L5)**

**Combinatorics**: Basic of Counting, Permutations, Permutations with Repetitions, Circular Permutations, Restricted Permutations, Combinations, Restricted Combinations, Generating Functions of Permutations and Combinations, Binomial Coefficients, Binomial Theorem.

**Unit – IV (12 sessions) (CO1, CO3, L2, L4)**

**Recurrence Relations**: Generating Functions, Function of Sequences, Partial Fractions, Calculating Coefficient of Generating Functions, Recurrence Relations, Formulation as Recurrence Relations.

**Unit – V (12 sessions) (CO1, CO4, L2, L4)**

**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, Euler’s Formula.

**Assessment methods**

Task	Task type	Task mode	Weightage (%)
A1. Mid exam	Individual	Written	20
A2. Coursera	Individual	Presentations / Q&A/Viva	10
A3. Class room presentation/Seminars and Case analysis/workshop/training/Assignments/survey/Project	Groups	Presentations/ Report with Q&A/Viva	10
A4. End-term exam	Individual	Written (short/long)	60

**Mapping COs - Blooms levels- Assessment Tools**

Knowledge dimension / cognitive dimension	L1. Remember	L2. Understand	L3. Apply	L4. Analyze	L5. Evaluate	L6. Create
Factual Knowledge		CO1 (A1, A3)				
Conceptual Knowledge			CO2 (A1, A3)			
Procedural Knowledge		CO1 (A1, A3)	CO2 (A1, A3)	CO3 (A2,A3)	CO4 (A2,A3)	
Meta Cognitive Knowledge				CO4 (A2,A3)	CO5 (A2, A3,A4)	

### Learning and teaching activities

Mixed pedagogy approach is adopted throughout the course. Classroom based face to face teaching, directed study, independent study via G-Learn, case studies, projects and practical activities (individual & group).

### Teaching and learning resources

Soft copies of teaching notes/cases etc. will be uploaded onto the G-learn. Wherever necessary, printouts, handouts etc. will be distributed in the class. Prescribed text book will be provided to all. However, you should not limit yourself to this book and should explore other sources on your own. You need to read different books and journal papers to master certain relevant concepts to analyze cases and evaluate projects. Some of these reference books given below will be available in our library.

#### Books for Reference:

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.
4. Discrete Mathematics for Computer Scientists and Mathematicians, J. L. Mott, A. Kandel, T.P. Baker, 2nd Edition, Prentice Hall of India.
5. Discrete Mathematical Structures, BernardKolman, Robert C. Busby, Sharon Cutler
6. Ross, PHI.
7. Discrete Mathematics, S. K. Chakraborty and B.K. Sarkar, Oxford, 2011.

### CO PO Mapping

This is to map the level of relevance of the Course Outcome (CO) with Programme Outcome (PO).

0= No Relevance; 1= Low Relevance; 2= Medium Relevance; 3= High Relevance

CO PO Mapping	PO1	PO2	PO3	PO4	PO5	PO6	Sum
	CO1	3	2	0	0	2	2
CO2	2	2	0	0	2	2	8
CO3	3	3	0	0	1	1	8
CO4	2	2	0	0	2	2	8
CO5	2	2	0	0	2	2	8
<b>Target Level Max.</b>	<b>12</b>	<b>11</b>	<b>0</b>	<b>0</b>	<b>9</b>	<b>9</b>	<b>41</b>

BA(BA) -Programme Outcomes (POs)	
1	Ability to understand the business problem with their knowledge in different functional areas of management
2	Integrate with structured, semi – structured and unstructured data.
3	Utilize the tools such as Microsoft Excel, SPSS, R, Weak and Tableau to solve business analytics problem
4	Ability to apply analytics techniques to analyze and interpret the data.
5	Incorporate the descriptive, predictive and prescriptive analytics.
6	Evaluate the necessary skills and understanding to take up advanced topics in the area of analytics and thus enhance their career.