

<i>DEPARTMENT OF INFORMATION TECHNOLOGY</i>				<i>CLASS: I B.Sc. Information Technology</i>				
<b>Sem.</b>	<b>Course Type</b>	<b>Course Code</b>	<b>Course Title</b>	<b>Credits</b>	<b>Contact Hours/week</b>	<b>CIA</b>	<b>Ext</b>	<b>Total</b>
I	Allied - 1	20U1FAC1	Discrete Mathematics	5	6	25	75	100

**Course Objectives:**

1. To acquire knowledge on Discrete Structure and apply Boolean laws.
2. To illustrate the use of relations and comparing various functions.
3. To understand and apply inductions and finding solutions for finite order relations.
4. To elucidate the significance of matrices.
5. To apply the laws & and rules used in logic in various applications.

**Unit-I: Set Theory**

Introduction – Sets - Notation and Description of Sets – Subsets - Venn-Euler Diagrams - operations on sets - Properties of set operations - verification of the Basic Laws of Algebra by Venn diagram - The principle of Duality.

**Unit-II: Relations**

Cartesian product of two sets - Relations - Representation of Relations - operations on Relations - Equivalence Relation. Functions and Operators - one-to-one, onto functions - Special types of functions - invertible functions - composition of functions.

**Unit-III: Mathematical Induction**

Techniques of Proof - Mathematical induction Recurrence Relation and Generating Functions: Recurrence – An introduction - Polynomials and their evaluations - Recurrence Relations - Solution of finite order Homogeneous Relations - Solution of finite order Non-Homogeneous Relations - Generating Functions.

**Unit-IV: Matrix Algebra**

Introduction - Matrix Operations - Inverse of a square matrix - Elementary operations and Rank of a matrix - Simultaneous equations - Eigen Values and Eigen Vectors.

**Unit-V: Logic**

Introduction - TF Statements – Connectives - Atomic and Compound statements - Well Formed Formulae - Truth table of a formula – Tautology - Tautological implications and equivalence of formulae - Lattices - Some properties of Lattices.

### **Books for Study**

1. Dr. M.K.Venkatraman, Dr.N.Sridharan, N.Chandrasekaran – “Discrete Mathematics” - The National Publishing Company - 2003.

#### **Chapters:**

Unit – I : 1.

Unit – II : 2.1-2.5, 3.

Unit – III: 4, 5.1-5.6.

Unit – IV : 6.1 -6.5, 6.7.

Unit – V : 9.1 -9.8,10.1 – 10.2.

### **Books for Reference**

1. Alan Doerr,Levassure – “Applied Discrete Mathematical Structures for Computer Science”.
2. Trembly and Manohar – “Discrete Mathematical Structures with Application to Computer Science”.

### **Web Resources**

1. <http://www.cs.yale.edu/homes/aspnes/classes/202/notes.pdf>
2. <http://home.iitk.ac.in/~aralal/book/mth202.pdf>

### **Pedagogy**

Chalk and talk, Materials, Assignment, Seminar, Problem solving, Group discussion, and Interaction.

**Course Learning Outcomes:**

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

CLO No.	Course Learning Outcomes	K - Level
CLO1	List various laws of Set theory. Apply the laws and properties to simplify the problems. Discuss the duality principle and solve the problems.	Up To K3
CLO2	Describe the representations of relations. Illustrate the usage of equivalence relations in real world problems. Outline different types of functions.	Up To K3
CLO3	Explain Mathematical induction and recurrence relations. Classify the finite order relations.	Up To K4
CLO4	Outline the operations on matrices. Solve simultaneous linear equations. Find the Eigen values and Eigen vectors.	Up To K3
CLO5	Relate Atomic and Compound statements of Logic. Identify the relationship between WFF and Tautology. Explain Lattices and its properties.	Up To K4

**Mapping of CLOs with POs:**

CLOs/POs	PO1	PO2	PO3	PO4	PO5
CLO1	3	2	1	1	3
CLO2	3	3	N/A	N/A	2
CLO3	3	3	N/A	N/A	2
CLO4	3	1	N/A	N/A	3
CLO5	3	2	1	1	3

3- Advanced Application; 2- Intermediate Level; 1- Basic Level; N/A- Not Applicable

**Mapping of CLOs with PSOs:**

CLOs / PSOs	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CLO1	3	2	3	2	2	N/A
CLO2	3	N/A	1	N/A	N/A	N/A
CLO3	1	1	2	N/A	1	N/A
CLO4	2	2	2	N/A	2	N/A
CLO5	3	3	3	2	3	1

3- Advanced Application; 2- Intermediate Level; 1- Basic Level; N/A- Not Applicable

**Learning Outcome Based Education & Assessment (LOBE)**  
**Blue Print for Summative Examination – Discrete Mathematics**  
**Articulation Mapping – K Levels with Course Learning Outcomes (CLOs)**

Sl. No	CLOs	K - Level	Section A		Section B		Section C (Either/ or Choice)	Section D (Open Choice)
			MCQs		Short Answers			
			No. of Questions	K - Level	No. of Questions	K - Level		
1	CLO 1	Up to K 3	2	K1 & K2	1	K1	2(K1 & K1)	1(K3)
2	CLO 2	Up to K 3	2	K1 & K3	1	K3	2(K3 & K3)	1(K2)
3	CLO 3	Up to K 4	2	K1 & K2	1	K1	2(K2 & K2)	1(K4)
4	CLO 4	Up to K 3	2	K1 & K2	1	K2	2(K3 & K3)	1(K1)
5	CLO 5	Up to K 4	2	K1 & K3	1	K3	2(K4 & K4)	1(K3)
No. of Questions to be asked			10		5		10	5
No. of Questions to be answered			10		5		5	3
Marks for each question			1		2		5	10
Total Marks for each section			10		10		25	30

**Distribution of Section-wise Marks with K Levels**

K Levels	Section A (No Choice)	Section B (No Choice)	Section C (Either/or)	Section D (Open Choice)	Total Marks	% of Marks without choice	Consolidated
K1	5	4	10	10	29	24.17	45%
K2	3	2	10	10	25	20.83	
K3	2	4	20	20	46	38.33	38%
K4	-	-	10	10	20	16.67	17%
<b>Total Marks</b>	10	10	50	50	120	100.00	100%

**Lesson Plan:**

<b>Units</b>	<b>Topics to be Covered</b>	<b>Hours</b>	<b>Mode</b>
I	Introduction – Sets - Notation and Description of Sets – Subsets - Venn- Euler Diagrams	6	Lecture
	operations on sets - Properties of set operations	5	Lecture
	Verification of the Basic Laws of Algebra by Venn diagram - The principle of Duality.	7	Lecture & GD
II	Cartesian product of two sets - Relations - Representation of Relations - operations on Relations	6	Lecture
	Equivalence Relation. Functions and Operators - one-to-one, onto functions	5	Lecture
	Special types of functions - invertible functions - composition of functions.	7	Lecture
III	Techniques of Proof - Mathematical induction, Polynomials and their evaluations.	6	Lecture
	Recurrence Relations - Solution of finite order Homogeneous Relations	6	Lecture
	Solution of finite order Non-Homogeneous Relations - Generating Functions.	6	Lecture
IV	Introduction - Matrix Operations	5	Lecture, PPT
	Inverse of a square matrix - Elementary operations and Rank of a matrix	6	Lecture, GD
	Simultaneous equations - Eigen Values and Eigen Vectors	7	Lecture, GD
V	Introduction - TF Statements – Connectives	5	Lecture
	Atomic and Compound statements - Well Formed Formulae - Truth table of a formula – Tautology	7	Lecture, GD
	Tautological implications and equivalence of formulae - Lattices - Some properties of Lattices.	6	Lecture, Assignment

**Name of the Course Designers:**

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