

<i>DEPARTMENT OF MATHEMATICS</i>				<i>CLASS: I B.Sc. Mathematics</i>				
<b>Semester</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>
II	Core	20U2MMC4	Discrete Mathematics	4	5	25	75	100

**COURSE OBJECTIVES:**

1. To provide the students with an overview of Discrete Mathematics.
2. To learn about topics such as logic and proofs, sets and functions, recurrence relations, generating functions.
3. To give clear idea about matrix theory.

**Unit-I: (SET THEORY AND MATHEMATICAL INDUCTION)**

Sets – Subsets-Operation on sets–Union, intersection, symmetric difference, Cartesian product - Properties of Set Operations-Principle of Duality-Mathematical Induction.

**Unit-II: (RELATIONS AND FUNCTIONS)**

Relations- Representation of relation - Operation on relation- equivalence relation- Partitions and equivalence Classes- Functions - One to One and Onto Functions- Special type of functions - Invertible functions- Composition of Functions.

**Unit-III: (MATHEMATICAL LOGIC)**

Statements- Connectives –Wellformed formula- Truth table of a formula- Tautology- Implication and equivalence of formulae-Normal forms.

**Unit-IV: (RECURRENCE RELATIONS AND GENERATING FUNCTIONS)**

Recurrence relations- Solution of first order homogenous linear relations- Solution of non-homogenous relations - Finding generating functions of a recurrence relation - solving recurrence relation using generating functions.

**Unit-V: (MATRIX ALGEBRA)**

Basic definitions - Symmetric and skew symmetric matrices - inverse of a matrix - Elementary transformations - Rank - Test of consistency - Solving linear equations - Cayley - Hamilton theorem and the uses to find inverse and powers of the matrix - Eigen values and eigen vectors.

**Text Book:**

1. M.K.Venkatraman, N.Sridharan and N.Chandrasekaran, Discrete Mathematics, The National Publishing Company (2007).  
Sections:1.1, 1.2, 1.4, 1.6, 1.7, 1.9, 2.1 to 2.5, 2.7, 3.1 to 3.5, 4.2, 5.1, 5.3 to 5.6, 9.2, 9.3, 9.5 to 9.8, 9.11.
2. S. Arumugam and A.T. Issac, Modern Algebra, SCITECH Publications PVT Ltd.,(2011).  
Sections: 7.3 to 7.8.

**Books for Reference:**

1. Trembly and Manohar, Discrete Mathematical structures with application to computer science, Tata McGraw Hill, New Delhi (1997).
2. Kenneth H. Rosen, “Discrete Mathematics and its Applications”, 7 th edition, Tata McGraw Hill, 2012.

**Web Resources**

1. <http://accounts.mtts.org.in/article-list.php?page=1&search=&sortby=>
2. [https://www.tutorialspoint.com/discrete\\_mathematics/index.htm](https://www.tutorialspoint.com/discrete_mathematics/index.htm)
3. <https://study.com/academy/course/math-108-discrete-mathematics.html>

**Pedagogy:** Lecture, power point Presentation, Group Discussion, Quiz, Seminar, Problem solving, Tutorial and LMS (CANVAS, FLICKERS).

## Course Learning Outcome

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

Number	Course Learning Outcome	Knowledge level
CLO1	Determine union, intersection, symmetric difference and Cartesian product of sets and also apply the principle of Mathematical induction to prove certain mathematical formula.	Up to K3
CLO2	Recognize equivalence relations and to categorize types of functions.	Up to K4
CLO3	Analyze the validity of a formula using mathematical logic and also to find normal forms of a formula.	Up to K4
CLO4	Construct and solve recurrence relations using generating functions.	Up to K3
CLO5	Classify types of matrices and also to solve linear equations by applying matrices.	Up to K3

K1- Remembering and recalling facts with specific answers

K2- Basic understanding of facts and stating main ideas with general answers

K3- Application oriented- Solving Problems

K4- Examining, analyzing, presentation and make inferences with evidences

### Mapping with Programme Specific Outcome

	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7
CLO1	3	1	1				2
CLO2	3	1				1	
CLO3	3	2	1		1	2	1
CLO4	3		2	1	1	2	
CLO5	3	2	2		1	2	1

### Pedagogy

Chalk and Talk, PPT, group discussion, seminar, interaction, problem solving, quiz, tutorial and virtual labs & Learning management systems (CANVAS)

### Mapping with Programme Outcome

	PO1	PO2	PO3	PO4	PO5
CLO1	3				
CLO2	2		2		
CLO3	2	1	3		
CLO4	2				
CLO5	1		2		1

3- Advanced Applications 2- Intermediate Level

1- Basic Level

### Lesson Plan

Unit	Description	Contact Hours	Total	Pedagogy
I	Introduction to sets subsets	1	15	ICT tools
	Operation on sets – union & intersection	3		Lecture
	Symmetric difference, Cartesian product	4		Lecture
	Principle of Duality	3		Lecture
	Mathematical Induction.	3		Lecture
	Tutorial	1		LMS(CANVAS)
II	Introduction to relations	1	15	Lecture
	Representation of relation	1		Lecture
	Operations on relations	2		Lecture
	Equivalence relation and equivalence classes	3		Lecture
	Introduction to Functions	1		Lecture
	Types of functions - One to One and Onto Functions	3		Lecture
	Invertible functions	1		Lecture
	Composition of Functions	2		Lecture
	Tutorial	1		QUIZ through FLICKERS
III	Statements	2	15	ICT tools
	Connectives	2		Lecture
	Well formed formula	1		Lecture
	Truth table of a formula	2		Lecture
	Tautology	2		Lecture
	Implication and equivalence of formulae	2		ICT Tools
	Normal forms	3		Lecture
	Tutorial	1		QUIZ through the LMS QUIZIZ
IV	Introduction to Recurrence relations	1	15	Lecture
	Solution of first order homogenous linear relations	4		Lecture
	Solution of non-homogenous relations	3		Lecture
	Finding generating functions of a recurrence relation	3		Lecture
	solving recurrence relation using generating functions	3		Lecture
	Introduction to Recurrence relations	1		Lecture
	Tutorial			Group Discussion
V	Basic definitions in matrix theory	1	15	Lecture
	Symmetric and skew symmetric matrices	2		Lecture
	Inverse of a matrix	1		Lecture
	Elementary transformations	1		Lecture
	Rank of a matrix	1		Lecture
	Test of consistency-Solving linear equations	2		ICT Tools
	Cayley - Hamilton theorem and the uses to find inverse and powers of the matrix	2		Lecture
	Eigen values and eigen vectors.	4		Lecture
	Tutorial	1		LMS –CANVAS
<b>Total hours</b>			<b>75</b>	

#### Course Designer

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