

Programme	B. Sc. Mathematics Honours			
Course Code	MAT3MN204			
Course Title	BOOLEAN ALGEBRA AND SYSTEM OF EQUATIONS			
Type of Course	Minor			
Semester	III			
Academic Level	200-299			
Course Details	Credit	Lecture/Tutorial per week	Practical per week	Total Hours
	4	4	-	60
Pre-requisites	MAT1MN203 and MAT2MN203			
Course Summary	This course comprises four main modules: Lattice, Boolean Algebra, System of Equations, and Eigenvalue and Eigenvectors. Module I introduce concepts like ordered sets and lattices, while Module II explores Boolean Algebra and its applications. Module III covers linear systems of equations, including Gauss elimination and determinants. Finally, Module IV delves into Eigenvalue and Eigenvectors, offering insights into matrix properties and applications.			

Course Outcome

CO	CO Statement	Cognitive Level*	Knowledge Category#	Evaluation Tools used
CO1	Analyse Lattices and Boolean Algebra	E	C	Internal Exam/Assignment/ Seminar/ Viva / End Sem Exam
CO2	Apply Matrix Operations and Linear Systems	Ap	P	Internal Exam/Assignment/ Seminar/ Viva / End Sem Exam
CO3	Investigate Eigenvalue and Eigenvector Problems	An	P	Internal Exam/Assignment/ Seminar/ Viva / End Sem Exam
* - Remember (R), Understand (U), Apply (Ap), Analyse (An), Evaluate (E), Create (C) # - Factual Knowledge(F) Conceptual Knowledge (C) Procedural Knowledge (P) Metacognitive Knowledge (M)				

Detailed Syllabus:

Textbook	1. Theory and Problems of Discrete mathematics (3/e), Seymour Lipschutz, Marc Lipson, Schaum's Outline Series. 2. Advanced Engineering Mathematics (10/e), Erwin Kreyzsig, Wiley India.			
Module	Unit	Content	Hrs (48 +12)	Ext. Marks (70)
I	Lattice (Text 1)		12	Min 15
	1	14.2 Ordered set		
	2	14.3 Hasse diagrams of partially ordered sets		
	3	14.5 Supremum and Infimum		
	4	14.8 Lattices		
	5	14.9 Bounded lattices, 14.10 Distributive lattices		
	6	14.11 Complements, Complemented lattices		
II	Boolean Algebra (Text 1)		10	Min 15
	7	15.2 Basic definitions		
	8	15.3 Duality		
	9	15.4 Basic theorems		
	10	15.5 Boolean algebra as lattices		
	11	15.8 Sum and Product form for Boolean algebras		
	12	15.8 Sum and Product form for Boolean algebras - Complete Sum and Product forms		
III	System of Equations (Text 2)		14	Min 15
	13	7.1 Matrices, Vectors: Addition and Scalar Multiplication		
	14	7.2 Matrix Multiplication (Example 13 is optional)		
	15	7.3 Linear System of Equations- Gauss Elimination		
	16	7.4 Linear Independence- Rank of a matrix- Vector Space (Proof Theorem 3 is optional)		

	17	7.5 Solutions of Linear Systems- Existence, Uniqueness (Proof of Theorem 1, Theorem 2 and Theorem 4 are optional)		
IV	Eigen Value and Eigen Vectors (Text 2)		12	Min 15
	18	7.6 Second and Third Order Determinants- up to and including Example 1		
	19	7.6 Second and Third Order Determinants- Third order determinants		
	20	7.7 Determinants- Cramer's Rule (Proof of Theorem 1, Theorem 2, Theorem 3 and Theorem 4 are optional)		
	21	7.8 Inverse of a Matrix- Gauss- Jordan Elimination (Proof Theorem 1, Theorem 2, Theorem 3 and Theorem 4 are optional)		
	22	8.1 The Matrix Eigenvalue Problem- Determining Eigenvalues and Eigenvectors (Proof of Theorem 1 and Theorem 2 are optional)		
V	Open Ended Module		12	
	Relation on a set, Equivalence relation and partition, Isomorphic ordered sets, Well-ordered sets, Representation theorem of Boolean algebra, Logic gates, Symmetric, Skew-symmetric and Orthogonal matrices, Linear Transformation.			
<p>References:</p> <ol style="list-style-type: none"> Howard Anton & Chris Rorres, Elementary Linear Algebra: Application (11/e) : Wiley Ron Larson, Edwards, David C Falvo : Elementary Linear Algebra (6/e), Houghton Mifflin Harcourt Publishing Company (2009) Thomas Koshy - Discrete Mathematics with Applications-Academic Press (2003) George Gratzner, Lattice theory: First concepts and distributive lattices. Courier Corporation (2009) 				

Note: 1) Optional topics are exempted for end semester examination. 2) Proofs of all the results are also exempted for the end semester exam.

Mapping of COs with PSOs and POs :

	PSO5	PSO6	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO 1	3	1	3	2	3	1	3	1	2
CO 2	3	2	3	2	3	2	3	1	2
CO 3	3	2	3	2	3	2	3	1	2

Correlation Levels:

Level	Correlation
-	Nil
1	Slightly / Low
2	Moderate / Medium
3	Substantial / High

Assessment Rubrics:

- Assignment/ Seminar
- Internal Exam
- Viva
- Final Exam (70%)

Mapping of COs to Assessment Rubrics:

	Internal Exam	Assignment	Seminar	Viva	End Semester Examinations
CO 1	✓	✓	✓	✓	✓
CO 2	✓	✓	✓	✓	✓
CO 3	✓	✓	✓	✓	✓