

Lecture Plan		
Name of the College: Government College of Arts, Science and Commerce, Sanquelim-Goa		
Name of Faculty: Rohit R. Redkar	Subject: Mathematics	
Paper code: MAT-211 Matrix Algebra (Theory)	Program: B.Sc.	Division: -
Academic year: 2026-27	Semester: - III	Total Lectures: 45
Course Objectives:		
1. To introduce and familiarize the learner with the System of Equations, Matrices and Matrix Operations, Gauss Elimination method, Diagonalisation and Quadratic forms.		
Expected Course Outcome:		
1) Display familiarity and knowledge of System of Equations, Matrices and Matrix Operations.		
2) Demonstrate proofs of Matrix Algebra.		
3) Choose the appropriate procedures and modify them, if needed, to solve method-based problems on the concepts in the syllabus.		
4) Analyze and solve unseen problems in Matrix Algebra and invent mathematically precise arguments to justify their solutions.		
Student Learning Outcome: Student will be able to		
1) Apply matrix algebra techniques to test linear independence, determine rank, and solve systems of linear equations.		
2) Compute characteristic values, apply the Cayley-Hamilton theorem, diagonalise matrices, and reduce quadratic forms.		

Month	Lecture From	Lecture To	No. of lectures allotted	Topic, Subtopic to be covered	Exercise/ Assignment	ICT Tools	Reference books
June July	22/06/2026	27/06/2026	3	Vectors in R^3 : operations with vectors (addition, scalar multiplication). Generalization of vector operations to R^n . Linear combinations of vectors.		Smart Board	H. Kishan: A Textbook of Matrices
	29/06/2026	04/07/2026	3	Linear dependence and independence of vectors - definitions and examples. Linear dependence and independence - theorems and examples. Basis of a vector space - definition and examples.		Smart Board	H. Kishan: A Textbook of Matrices
	06/07/2026	11/07/2026	3	Dimension of a vector space. Practice problems on basis, dimension and linear independence (Unit I). Types of matrices; elementary operations on a matrix.			H. Kishan: A Textbook of Matrices
	13/07/2026	18/07/2026	3	Special matrices - Symmetric and Skew-symmetric matrices. Conjugate of a matrix; Hermitian matrices. Nilpotent and Idempotent matrices.		Smart Board	H. Kishan: A Textbook of Matrices
	20/07/2026	25/07/2026	3	Properties/results on symmetric, skew-symmetric and Hermitian matrices. Properties/results on nilpotent and idempotent matrices. Elementary matrices; effect of multiplying by elementary matrices on a matrix.		Smart Board	H. Kishan: A Textbook of Matrices
Jul/Aug	27/07/2026	01/08/2026	3	Equivalence of matrices; row and column equivalence. Echelon forms of a matrix. Normal form of a matrix.	ISA I Assignment		S. Narayan and P. K. Mittal: A Textbook of Matrices

August	03/08/2026	08/08/2026	3	Practice problems on elementary matrices and equivalence. Practice problems on echelon and normal forms (Unit II). Rank of a matrix - definition using minors.		Smart Board	H. Kishan: A Textbook of Matrices
	10/08/2026	15/08/2026	3	Finding rank of a matrix using definition (up to 3×3). Theorem: elementary operations do not change the rank of a matrix. Finding rank of a matrix using echelon forms.		Smart Board	H. Kishan: A Textbook of Matrices
	17/08/2026	22/08/2026	3	Practice problems on finding rank (definition and echelon methods). Linear independence of row and column matrices. Definition of rank of a matrix using independence of row/column vectors.			H. Kishan: A Textbook of Matrices
	24/08/2026	29/08/2026	3	Equivalence of the two definitions of rank; practice problems. Application of matrices: existence of solutions of a system of linear equations using the rank method. Solving systems of linear equations using the Gauss Elimination method.		Smart Board	H. Kishan: A Textbook of Matrices
Aug/Sep	31/08/2026	05/09/2026	2	Practice problems on Gauss Elimination method. Solving systems of linear equations using the Gauss-Jacobi method. Solving systems of linear equations using the Gauss-Seidel method.	ISA II Test	Smart Board	H. Kishan: A Textbook of Matrices

September	07/09/2026	12/09/2026	3	Practice problems on Gauss-Jacobi and Gauss-Seidel methods. Characteristic values of a matrix. Cayley-Hamilton theorem - statement and verification.			H. Kishan: A Textbook of Matrices
	14/09/2026	19/09/2026	0	Ganesh Chaturthi Break (14–19 Sep)			
	21/09/2026	26/09/2026	3	Cayley-Hamilton theorem - applications. Diagonalisation of a matrix - concept and conditions. Diagonalisation of a matrix - worked examples.		Smart Board	H. Kishan: A Textbook of Matrices
Sep/Oct	28/09/2026	03/10/2026	2	Practice problems on characteristic values and diagonalisation. Unit III review and problem solving. Quadratic form as a matrix product.	ISA III	Smart Board	H. Kishan: A Textbook of Matrices
October	05/10/2026	10/10/2026	3	Diagonal reduction of a symmetric matrix. Reduction of quadratic form into sum of squares form. Practice problems on quadratic forms; Unit IV review.		Smart Board	H. Kishan: A Textbook of Matrices
	12/10/2026	14/10/2026	2	Term-end revision			

*** Assessment Rubrics**

Component	Max Marks
ISA 1	7.5
ISA 2	7.5
Practical	Nil

Project	Nil
Semester End Exam	60