



(Master of Science in Statistics) (Master of Science)
(M. Sc.) (Statistics) Semester (I)

Course Code	PS01CSTA52	Title of the Course	MATRIX ALGEBRA
Total Credits of the Course	04	Hours per Week	04

Course Objectives:	To familiarize the students with basic concepts and results of matrix algebra and their applications in Statistics.
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Course Content		
Unit	Description	Weightage* (%)
1.	Vector Spaces, Subspaces, linear independence, spanning set and basis, dimension, linear transformation, kernel, range, gram-schmidt orthogonalization, Orthogonal Projection, Matrix Representation of a linear transformation. Algebra of Matrices, canonical forms, diagonal form, Triangular form.	25
2.	Trace and Rank of a Matrix and their properties. Determinant and Inverse of partition matrices, special matrices and their properties, orthogonal and idempotent matrices and their properties. Quadratic forms, Positive/Negative definiteness and related results with proofs. Generalized inverses (g-inverses) and related results with proofs	25
3.	Eigen Value and Eigen vectors. Matrix Factorizations - Spectral decomposition, singular value decomposition. Cayley-Hamilton theorem.	25
4.	Methods of constructing g-inverses, general solution to a system of linear equations. Matrix derivatives and Jacobians. Applications of matrix algebra in Statistics.	25

Teaching-Learning Methodology	On-line/off-line
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Evaluation Pattern		
Sr. No.	Details of the Evaluation	Weightage
1.	Internal Written / Practical Examination (As per CBCS R.6.8.3)	15%





SARDAR PATEL UNIVERSITY
Vallabh Vidyanagar, Gujarat
(Reaccredited with 'A' Grade by NAAC (CGPA 3.25))
Syllabus with effect from the Academic Year 2021-2022

2.	Internal Continuous Assessment in the form of Practical, Viva-voce, Quizzes, Seminars, Assignments, Attendance (As per CBCS R.6.8.3)	15%
3.	University Examination	70%

Course Outcomes: Having completed this course, the learner will develop abilities stated below:

1.	Understand and apply the concepts and results of vector spaces.
2.	Understand and apply the concepts and results of matrices.
3.	To obtain factorization of matrices using relevant concepts.
4.	To compute inverse and g-inverse of given matrix.

Suggested References:

Sr. No.	References
1.	Basilevsky, A. (1983). Applied Matrix Algebra in the Statistical Sciences, North Holland.
2.	Graybill, F. A. (1969). Introduction to matrices with applications in Statistics, John Wiley.
3.	Searl, S. R. (1982). Matrix Algebra(In Gujarathi), John Wiley.
4.	Rao, A. R. and Bhimasankaran, P. (1992). Linear Algebra, Tata McGraw Hill, New Delhi.

On-line resources to be used if available as reference material

On-line Resources

