20BSM208T				Basic Linear Algebra					
Teaching Scheme				Examination Scheme					
L	T	P	C	Hrs. / Week	Theory			Practical		Total Marks
					MS	ES	IA	LW	LE/Viva	
3	1	0	4	4	25	50	25	--	--	100

COURSE OBJECTIVES

- To provide students with a good understanding of the concepts and methods of linear algebra.
- To help the students develop the ability to solve problems involving concepts in matrices.
- To connect linear algebra to other fields both within and without mathematics.
- To develop abstract and critical reasoning by studying logical proofs and the axiomatic method as applied to linear algebra.

UNIT 1 MATRIX THEORY – I **08 Hrs.**

Matrices, Matrix Operations, Special Types of matrices, Elementary Matrices, inverse of Matrix, Rank and its properties, diagonal and orthogonal matrix, Determinants and its properties, Application of determinants.

UNIT 2 MATRIX THEORY – II **10 Hrs.**

System of Linear Equations: Introduction to systems of Linear Equations, geometry of linear equations, elementary operations on matrix, row-reduced echelon matrices, applying row reduction to obtain the inverse of a matrix, Solution of system of equation by Matrix inversion, Cramer's rule, Gauss Elimination and Gauss Jordan Elimination Method, Conditions for consistency of the system.

UNIT 3 VECTOR SPACES, LINEAR TRANSFORMATION AND INNER PRODUCT SPACES **12 Hrs.**

Euclidean n - space, Vector space and Subspaces, Linear dependence and Independence; Basis, Dimension, Linear Transformations and its relevant theories related with matrices, Row space, Null space; column space and rank of a matrix, Rank and Nullity, Dimension Theorem, Inner product, Orthogonality in Inner Product Spaces, Orthonormal Bases; Gram-Schmidt process, Least squares approximation, Orthogonal Matrices.

UNIT 4 EIGENVALUES AND EIGENVECTORS **10 Hrs.**

EigenValues and EigenVectors, Properties of Eigenvalues, Diagonalization, Cayley-Hamilton theorem and its application, bilinear and quadratic forms.

40 Hrs.

COURSE OUTCOMES

On completion of the course, student will be able to

CO1 – Identify the use of matrices in real world problems.
CO2 – Understand the applications of systems of linear equations in various science and engineering fields.
CO3 – Explain the behavior of a set of vectors on the basis of linear dependence or independence.
CO4 – Analyze the interconnection of Vector spaces, Inner product spaces and orthogonality.
CO5 – Appraise mathematical problems pertaining to rank and nullity which are related with many other mathematical notions.
CO6 – Formulate problems based upon Eigenvalues and Eigenvectors and construct their real applications in various technological fields.

TEXT / REFERENCE BOOKS

1. S. Lipschutz, M. Lipson, Linear Algebra, Schaum's outline series, 4th ed., McGraw-Hill Education India Pvt. Ltd - New Delhi, 2009.
2. H. Anton, Elementary Linear Algebra with Applications, 11th ed., John Wiley, 2013.
3. E. Kreyszig, Advanced Engineering mathematics, 10th ed., John Wiley, 2015.
4. G. Strang, Linear Algebra and its applications, 4th ed., Cengage Learning, 2005.
5. K. Hoffman and R. A. Kunze, Linear Algebra, Prentice Hall of India, 2002.

END SEMESTER EXAMINATION QUESTION PAPER PATTERN

Max. Marks: 100	**Exam Duration: 3 Hrs.**
Part A: 6 questions of 4 marks each	24 Marks
Part B: 6 questions of 8 marks each	48 Marks
Part C: 2 questions of 14 marks each	28 Marks