Programme: B.Sc. Degree Class: B.Sc.	Year: III	Semester: VI

Subject: Mathematics

Course Code: **Course Title: Linear Algebra**

Course Outcome	CO1: Liner algebra is a basic course in almost all branches of science. The objective of this course is to introduce a student to the basics of linear algebra and some of its applications. CO2: After Successful completion of this course, students should be able to understand the concept of linear transformation which will prepare the students to take up further applications in the relevant fields CO3: The student will use this knowledge in computer science, finance mathematics, industrial mathematics and bio mathematics. After completion of this course students appreciate its interdisciplinary nature.

Unit No.	Course Content	Hours
I	Elementary transformations, Echelon and normal forms, Rank of a matrix, Application of matrices to solve a system of linear (both homogeneous and non-homogeneous) equations, Consistency and general solutions.	12
II	Vector space: Introduction, subspaces, Linear combinations, linear spans, Sums and direct sums, Linear dependence and independence, Bases and dimensions, Dimensions and subspaces, Coordinates and change of bases.	12
III	Linear transformations: Linear transformations, rank and nullity, Linear operators, Algebra of linear transformations, Invertible linear transformations, Isomorphism	12
IV	Matrix of a linear transformation relative to ordered bases of finite-dimensional vector spaces. Correspondence between linear transformations and matrices, Linear functional: Linear functional, Dual space and dual basis, Double dual space, Annihilators, Transpose of a linear transformation.	12
V	Eigen values and Eigen vectors: Eigen vectors and Eigen values of a matrix, product of characteristic roots of a matrix and basic results on characteristic roots, Cayley-Hamilton theorem and its use in finding inverse of a matrix	12

Suggested Readings:

1. Stephen H. Friedberg, Arnold J. Insel, Lawrence E. Spence: *Linear Algebra,* 4th Ed., Prentice-Hall of India Pvt. Ltd., New Delhi, 2004.
2. David C. Lay: *Linear Algebra and its Applications,* 3rd Ed., Pearson Education Asia, Indian Reprint, 2007.
3. S. Lang: *Introduction to Linear Algebra,* 2nd Ed., Springer, 2005.
4. Gilbert Strang: *Linear Algebra and its Applications*, Thomson, 2007.
5. Hoffman and Kunze: Linear Algebra, Prentice Hall of India, New Delhi, 1972.
6. H. Helson: Linear Algebra, Hindustan Book Agency, New Delhi, 1994.
7. Suggested digital plateform:NPTEL/SWAYAM/MOOCs

Mapping of course outcomes with program outcomes & program specific outcomes

CO's No.	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4
CO1	3	3	3	3	2	2	3	3	3
CO2	3	3	3	2	2	3	3	2	3
CO3	3	3	3	3	3	3	3	2	3