

**BS112: LINEAR ALGEBRA AND FOURIER SERIES  
CREDITS - 4 (LTP:3,1,0)**

**Course Objectives:**

The basic necessity for the Foundation of Engineering & Technology being Mathematics, the main aim is, to teach Mathematical concepts, develop Mathematical skills & enhance thinking power of students.

**Teaching and Assessment Scheme:**

Teaching Scheme (Hours per week)			Credits	Assessment Scheme				
L	T	P		C	Theory Marks		Practical Marks	
			ESE		CE	ESE	CE	
3	1	0	4	60	40	20	30	150

**Course Contents:**

Unit No.	Topics	Teaching Hours
1	Matrices: addition and multiplication by scalar, matrix multiplication; Linear systems of equations (homogeneous and nonhomogeneous), rank of a matrix, determinants, Cramer's Rule, inverse of a matrix, Gauss elimination and Gauss-Jordan elimination.	10
2	Vector Space, linear dependence of vectors, basis, dimension; Linear transformations (maps), range and kernel of a linear map, rank and nullity, Inverse of a linear transformation, rank-nullity theorem, composition of linear maps, Matrix associated with a linear map.	12
3	Eigenvalues, eigenvectors, symmetric, skew-symmetric, and orthogonal Matrices, eigen bases. Diagonalization; Inner product spaces, Gram-Schmidt orthogonalization.	10
4	Periodic function, Fourier series, Functions of any period, Even and odd functions, Half-range Expansion, Parseval's theorem.	10
<b>Total</b>		<b>42</b>

**List of References:**

- Howard A. and Chris R., "*Elementary Linear Algebra*", John Wiley & Sons, 2005.
- Grewal B. S., "*Higher Engineering Mathematics*", Khanna Publisher, New Delhi, (Latest Edition).
- Bali N. P. and Goyal M., "*Engineering Mathematics*", Laxmi Publication (Latest Edition).

**Course Outcomes (COs):**

On successful completion of the course, students will be able to:

- Solve system of linear equations using different tools of linear algebra for the problems arising in the field of engineering.
- Understand the concepts like vector space, Eigen values and Eigen vector and their application in various subjects of engineering.
- Understand and apply use of linear transformation arising in different subject of engineering.
- Do expansion of functions in terms of basic trigonometric functions.
- Adapt tools of Fourier series and half range series for expansion of various functions for learning advanced engineering mathematics.