

**B.M.S COLLEGE OF ENGINEERING (AUTONOMOUS), BENGALURU-19**  
**DEPARTMENT OF MATHEMATICS**  
**SYLLABUS (2011 - 2012)**

<b>Course Name</b>	<b>Linear Algebra</b>	<b>Course Code</b>	<b>11MA8IELIA</b>
<b>Credits</b>	<b>04</b>	<b>L – T - P</b>	<b>4 -0- 0</b>
<b>Contact hours</b>	<b>52 hours</b>		

**Course outcomes:**

Students on completion of the course will

- i) Solve systems of linear equations using Gaussian elimination method, LU factorization method etc.
- ii) Apply principles of matrix algebra to linear transformations.
- iii) Calculate inner products and associated norms.
- iv) Compute eigen values and eigen vectors and diagonalise matrices.
- v) Apply Gram-Schmidt process and compute least square solution.
- vi) Demonstrate an understanding of Gram Schmidt process and Singular value decomposition.

**UNIT-1**

**Linear equations:** Review of Matrix theory, System of linear equations and its solution sets; elementary row operations and echelon forms; matrix operations; invertible matrices, LU-factorization.

**Application of Linear Equations:** Graph Theory, Computer Graphics, Electrical Circuits and Markov Chains.  
[12 hours]

**UNIT-2**

**Vector Spaces:** Vector spaces; bases and dimension; coordinates, summary of row-equivalence; computations concerning subspaces.

**Linear Transformations:** Linear transformations; algebra of linear transformations; isomorphism; representation of transformations by matrices; linear functional; transpose of a linear transformation.  
[14 hours]

**UNIT-3**

**Canonical Forms:** Characteristic values; methods for computing eigen Values-Gerschgorin circle method, Jacobi's method, Givens' method, iterative estimates, invariant subspaces; direct-sum decompositions; invariant direct sums; primary decomposition theorem (without proof); cyclic bases; Jordan canonical form.  
[12hours]

#### **UNIT-4**

**Inner product spaces:** Inner products; inner product spaces; orthogonal sets and projections; Gram-Schmidt process; QR-factorization; least-squares problems; unitary operators.

**[08 hours]**

#### **UNIT-5**

**Symmetric Matrices and Quadratic Forms:** Diagonalization; quadratic forms; constrained optimization; singular value decomposition.

**[08 hours]**

#### **TEXT BOOKS:**

**1. Introductory Linear Algebra with Applications** by Bernard Kolman and David R.Hill, 7<sup>th</sup> edition, Pearson Education (Asia) Pte.Ltd.

**2. Theory and problems of linear algebra** from Schaum's outline series, 3<sup>rd</sup> edition, Tata McGraw-Hill publications.

#### **Question Paper Pattern:**

1. Each unit consists of one full question.
2. Each full question consists of two, three or four subdivisions.
3. Five full questions to be answered.
4. Internal choice in Unit 1 and Unit 2.