Detailed syllabus for Semester II

B E (First Year) MATHEMATICS II

Sr.No.	Topics
1	Vectors in R^n
	I. Properties of R^n II. Dot product, Norm and Distance properties in R^n III. Pythagorean theorem in R^n
2	Vector spaces
	I. Definition & Examples II. Vector Subspaces of R^n III. Linear Independence and dependence IV. Linear Span of set of vectors V. Basis of subspaces , Extension to Basis
3	System of linear equations
	I. Matrices a. Definition and Algebra of matrices b. Types of Matrices II. Methods to solve System of linear equations a. Gaussian Elimination (Row echelon form) b. Gauss-Jordan method (Reduced row echelon form). c. Inverse of matrices (i) By Gauss-Jordan method (ii) By Determinant method d. Rank of Matrix (iii) By Row Echelon form (iv) In terms of Determinant (v) By row space and column space
4	Linear Transformations
	I. Definition and Basic properties II. Types of Linear Transformations (Rotation, reflection, expansion, contraction, shear, projection) III. Matrix of Linear transformations IV. Change of Basis and similarity V. Rank Nullity Theorem (Dimension Theorem)

5	Inner Product Spaces
	I. Definition and properties II. Angle and orthogonal basis, Orthogonormality of basis III. Gram Schmidt's Orthogonalisation process IV. Projections theorem V. Least squares approximations (linear system)
6	Eigen values and Eigen vectors
	I. a. Definition b. Characteristic Polynomials II. Eigen values of Orthogonal , symmetric, skew symmetric, Hermitian , skew Hermitian, unitary, normal matrix III. Algebraic and geometric multiplicity IV. Diagonalisation by similarity transformation V. Spectral theorem for real symmetric matrices VI. Application to Quadratic forms

Reference books:

1) H. Anton, Elementary linear algebra with applications-(9 th Edition), Wiley-India.(2008)
2) G. Strang, Linear Algebra and its applications (4 th Edition), Thomson.(2006)
3) E. Kreyszig, Advanced Engineering mathematics(8 th Edition), Wiley-India.(1999)
4) S. Kumaresan, Linear Algebra – A Geometric approach , Prentice Hall India (2006)

Remark: All Results and Theorems are without proof