National Institute of Technology Karnataka
Course Plan and Evaluation Plan

Course Code   :   MA204
Course Title   :   Linear Algebra and Matrices
L-T-P   :   3-0-0
Credits   :   3
Teaching Department   :   Mathematical and Computational Sciences (MACS)
Evaluation Plan   :   10 % weightage for Quiz-I
                           25 % weightage for Mid-Semester Exam
                           15 % weightage for Quiz-II
                           50 % weightage for End-Semester Exam
Attendance   :   Must have at least 75 %
Course Instructors   :   Dr. Santhosh George (Course co-ordinator)
                           Dr. P. Sam Johnson

Topics

1. **Vector spaces:** Definition, examples, subspaces, few elementary results with proof, linear dependence/independence of vectors, spanning set, basis, dimension, few results with proof.

2. **Linear Equations:** Systems of linear equations, elementary matrices, row reduction and echelon forms, matrix multiplication, Gaussian elimination, transposes, finding inverses by elementary row operations.

3. **Determinants:** Properties and formulas for the determinant, applications of determinant, Cramer's rule, finding the inverse of a partitioned matrix.

4. **Orthogonality:** Inner product, norm, orthogonal vectors, orthogonal basis, orthogonal subspaces, Cauchy Schwartz inequality, Gram-Schmidt process, least-square problem.

5. **Linear Transformations:** Definition, algebra of linear transformations, representation of transformations by matrices and vice-versa, null space, range space, few results on linear transfromations and rank-nullity theorem with proofs, finding matrix of a linear transformation with respect to given bases.

6. **Eigenvalues and Eigenvectors:** The characteristic equation, finding eigenvalues and eigenvectors, properties of eigenvalues, diagonalization.

7. **Symmetric Matrices and Quadratic Forms:** Diagonalization of symmetric matrices, quadratic forms, positive definiteness, singular value decomposition.

Text Books

1. G. Hadley, Linear Algebra, Narosa 2000.

2. G. Strang, Linear Algebra and its Applications, Thomson Learning, 2003.

3. David C. Lay, Linear Algebra and its Applications, Pearson, 2008.

4. Ward Cheney and David Kincaid, Linear Algebra Theory and Applications, Jones & Bartlett Student Edition, 2007.

5. I.N. Herstein, Topics in Algebra, John Wiley & Sons, 1998.