

Semester	1
Course ^{*1}	Minor
Paper code	B1MT230121T
Paper Title	Linear Algebra [Economics + Computer Science]
No. of Credits ^{*2}	4
Theory / Practical / Composite	Theory
Minimum No. of preparatory hours per week a student has to devote	4
Number of Modules	Nil
Syllabus	<ol style="list-style-type: none"> 1. Determinants, Matrices and system of linear equations [17]: Product of two determinants; Adjoint, symmetric and skew-symmetric determinants and related problems [3]. Laplace's expansion method for fourth order determinants [1]. Trace of a square matrix- its basic results; symmetric, skew-symmetric and orthogonal matrices and related problems [3], Hermitian, Skew Hermitian and Unitary matrices and related problems [2], Elementary row operations on a matrix: Row Echelon form , Inverse of a matrix by elementary row operations , Rank of a matrix[4]. Consistency and solution of a system of linear equations [2] Gauss Elimination method [2]. 2. Linear Spaces and Linear Operators [16]: Definition of vector space over R: examples [2], concepts of linear span, linear dependence and independence of a finite set of vectors, subspaces [4], Idea of basis of a finite dimensional real vector spaces [2]. Statement of addition, deletion and replacement theorems: examples [2]. Linear Operators on linear spaces: matrix representation [6]. 3. Inner Product Spaces [6]: Definition and examples, Orthogonal and Orthonormal set of vectors [2], Schwarz Inequality, Gram-Schmidt process [4].

	<p>4. Eigenvalues & Diagonalization of Matrices [9]: eigen values and eigenvectors and related problems [5]. Diagonalization of Matrices [4].</p> <p>5. Real Quadratic Forms. [4]</p>	
Learning Outcomes *3	<p>On successful completion of the course a student will be able to do the following:</p> <ul style="list-style-type: none"> • Will get introduced to matrices as a means of representing linear maps like geometrical transformations and coordinate changes and how does evaluating determinant associated with a square matrix helps in establishing important properties like invertibility of the matrix thereby providing an useful tool in physical sciences. • Get acquainted with concept of linearity and use of linearity to generate whole of a system from its part. • Learn the methods of checking whether a given system of hyperplanes have a common point and, in case it has, to find the common points. • Getting familiarized with the process of writing a system of linear equations in terms of matrices. • Learn eigenvector corresponding to a transformation matrix as the direction in which it is stretched by the transformation matrix. • Getting familiarized with the definition of length of a vector and studies its properties. 	
Reading/Reference Lists *4	<ul style="list-style-type: none"> • Linear Algebra--a Geometric Approach -- S. Kumaresan • Higher Algebra (Linear and Abstract)—S.K.Mapa <p>Online Lectures:</p> <ul style="list-style-type: none"> • https://youtu.be/9h_Q-R6sXbM • https://youtu.be/nH05UiErAX4 	
Evaluation	<p>Theory</p> <p>CIA: 20+5+5=30</p> <p>Semester Exam: 70</p>	<p>Practical (if applicable)</p> <p>CA:</p> <p>Semester Exam:</p>
Paper Structure for Theory Semester Exam	7 questions each carrying 10 marks out of 12/13 questions	