Semester	**III**
Course	**Minor**
Paper Code	B2MT230311T
Paper Title	Linear Algebra and Multi-Variate Calculus [Chem+ Microbio+Biotech]
No. of Credits	**4**
Theory / Practical / Composite	**Theory**
Minimum No. of preparatory hours per week a student has to devote	**4**
Number of Modules	Nil
Syllabus	1.Linear Spaces and Linear Operators [18]: Definition of vector space over R: examples and its properties [4], concepts of linear span, linear dependence and independence of a finite set of vectors, subspace[4], Idea of basis of a finite dimensional real vector space. Statement of addition, deletion and replacement theorems: examples [5]. Linear operators on real linear spaces: Rank-Nullity theorem; Applications only [5]. Eigenvalues & Diagonalization of Matrices [7]: eigen values and eigenvectors and related problems[4]. Diagonalization of Matrices[3]. 2.Multivariate Calculus [17]: Partial Derivative: knowledge and use of Chain Rule, Exact differentials and its applications to problems [6] , Euler's Theorem on homogeneous functions Taylor's theorem for function of (more than one) two variables [5], Maxima and minima of functions of more than one variable, Lagrange's method of undetermined multiplier and related problems. [6] Double integrals [10]: Evaluation of Double Integrals over rectangular regions and non-rectangular regions [5], Change of Variable in double Integrals. [5].

Learning Outcomes	• Learning Real Vector Spaces, Linear Transformations and their salient properties. • Learning diagonalization of a matrix. • Getting acquainted with function of several variable calculus. • Learning double integrals over rectangular and non-rectangular regions.	
Reading/Reference Lists	1. Higher Algebra (Linear & Abstract): S.K.Mapa 2. Abstract Algebra by Sen, Ghosh, Mukhopadhyay. 3. Matrix and Linear Algebra Kanti Bhushan Datta. 4. Mathematical Analysis: S.C. Malik 5. Differential Calculus: An Introduction to Analysis: Maity & Ghosh 6. Real Analysis: S.K.Mapa 7. Calculus: T.M.Apostol, Vol-II	
Evaluation	70	30
Paper Structure for Theory Semester Exam	7 questions each carrying 10 marks needs to be answered out of 12/13 questions.	