Semester	**4**
Course	**Minor (Chem+Microbio+Biotech)**
Paper Code	**B2MT230411T**
Paper Title	**Vector Integration and Probability Theory**
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	**Vector Integration [20]:** Line, Surface and Volume integrals [8], Green's theorem in a plane [2], Stokes theorem and related problems [6], Gauss Divergence Theorem [no proof] and its physical applications [4]. **Probability Theory [32]:** Experiments: Deterministic and Non-deterministic; Sample space connected to different random experiments, examples [finite, countably infinite and uncountable]. [1] Events: Elementary and compound events, examples. Formation of new events through different algebraicoperations on them [union, intersection, complement].[1] Definitions of sure event ; impossible event, mutually exclusive events along with examples.[1] Idea of pair-wise disjoint /mutually exclusive, mutually exhaustive events for a class of events, examples.[1]. Introduction to the idea of probability: different interpretations: Frequency interpretation; Classical interpretation [criticism or shortcomings of this approach, problems][1] Kolmogorov's Axiomatic approach[Kolmogorov's probability axioms].[1] Properties of probability function.[3] Boole's and Bonferroni's inequality [2] Conditional Probability. definition, examples,.[2] multiplication ruleof probability, Bayes' theorem, related problems. [2] Independence of two events. extension to a finite/ countably infinite collection of events, pairwise and mutual independence, problems. Trials. Independent trials [Bernoulli][1] Introduction to random variables: Distribution function. Properties.[3] Classification of random variables: discrete and absolutely continuous random variables. Probability mass function and probability density function and properties[3]Transformation of one dimensional random variable (discrete and absolutely continuous) and related problems.[2] Examples of Discrete and Absolutely Continuous random variables: Binomial, Poission , Uniform, Normal

	.[2] Moments for univariate distributions. Raw and central. Properties , Expectation and variance and related problems [6].
Learning Outcomes	On successful completion of the course a student will be able to do the following. • Will get familiarized with line, surface and volume integrals and understand its applications. • Getting introduced to Green's Theorem, Stoke's theorem and Gauss's divergence theorems and realizing its geometrical interpretations. • Understand the concept of randomness through introduction to random experiments and probability theory. • Understanding conditional probability, Bayes theorem and its applications. • Getting introduced to random variables and probability distribution function. • Understanding transformation applied to univariate distributions and its applications. • Getting familiarized with moments of univariate distributions and their applications.
Reading/Reference Lists	• Calculus Vol 2: T.M.Apostol. • Vector Analysis: Chakraborty & Ghosh. • A Textbook of Vector Analysis: Shanti Narayan & P.K.Mittal. • Mathematical Probability: Banerjee, De, Sen. • Introduction to Probability Theory: Sheldon Ross. • Basic Probability Theory: Robert B Ash.
Evaluation	End Sem;70 CIA:30
Paper Structure for Theory Semester Exam	7 questions each carrying 10 marks out of 13/14 questions.