

CORE (Mathematics) COURSE 5 : MTH1212 Multivariate Calculus (BScBEd, Semester 2)

Course Code	Course Name	L-T-P	Credits
MTH1212	Multivariate Calculus and Vector Calculus	3-1-0	4

Module 1: Differential Calculus of Functions of Two Variables

Functions of two or more variables, Domain and range of functions of two variables; Limits and Continuity functions of two variables; Partial derivatives of first and second order; Higher Order Partial Derivatives; Distinction between derivatives and differential coefficients, Equality of mixed order partial derivatives of second order; Euler's theorem on homogenous functions; Mean value theorem for functions of two variables; Taylor's theorem for functions of two variables.

Module 2: Integral Calculus of Functions of Two Variables

Definition of a line integral and basic properties, Evaluation of line integrals, Definition of double integral, Conversion to iterated integrals, Evaluation of Double integral, change of variables, Surface areas. Definition of a triple integral, Evaluation, Volume as a triple integral.

Module 3: Improper Integrals and Their Convergence

Improper integrals of the first and second kinds, Convergence, Gamma and Beta functions, Connection between Beta and Gamma functions, Application to evaluation of Integrals, Duplication formula, Sterling formula.

Module 4: Vector Calculus

Vectors, Scalars, Vector field, Scalar field, Vector differentiation, Vector differential operator Del, Gradient, Curl, Vector integration, The divergence theorem of Gauss, Stoke's theorem, Green's theorem in plane.

Suggested Reading:

1. Lang (1998). First Course in Calculus. Addison-Wiley
2. Thomas and Finney (2010). Calculus and Analytic Geometry. Pearson Education India.
3. Widder (1989). Advanced Calculus. Dover Publications.
4. Hallet, Gleason, et al. (2012). Calculus, Single and Multivariable. Wiley.
5. Narayan, S. and Mittal (2005). Integral Calculus. S Chand and Co Ltd.
6. Kreyszig (2015), Advanced Engineering Mathematics, Wiley Eastern Ltd.