Multivariable Calculus   L-T-P: 3-1-0   Credit:4   MAxxxxx

Prerequisite: Single Variable Calculus

Syllabus

Functions of several variables: Limit, continuity, partial derivatives and their geometrical interpretation, directional derivative. **[5 Lectures]**

Total differential and differentiability, derivatives of composite and implicit functions, mean value inequalities. Inverse mapping theorem and Implicit mapping theorem. **[5 Lectures]**

Derivatives of higher order and their commutativity; Euler's theorem on homogeneous functions, Taylor's expansion of functions.**[4 Lectures]**

Maxima and minima, constrained maximum/minimum problems using Lagrange's method of multipliers**. [5 Lectures]**

Integral Calculus: Double and triple integrals, changing the order of integration, change of Variables-Jacobian of a transformation, computation of surface area and volume. **[8 Lectures]**

Vector Calculus: Definition of vector and scalar fields, level surfaces, limit, continuity, differentiability of vector functions. **[2 Lectures]**

Directional derivative, gradient, curl, divergence and their geometrical interpretation **[4 Lectures]**

Line integral, path independence of line integrals; Green's theorem **[4 Lectures]**

Gauss divergence theorem and Stokes' theorem. **[4 Lectures]**

Around 12 tutorial classes will be taken.

References:

   1. Tom M Apostol. *Calculus, Volume 2*. John Wiley & Sons,

   2. Thomas and R. L. Finney, Calculus and Analytic Geometry (9th Edition), ISE Reprint, Addison-Wesley, 1998

   3. Differential and Integral calculus by N. Piskunov Vol I and II,1996, Mir Publisher

   4. A Course in Multivariable Calculus and Analysis by S R Ghorpade and B V Limaye, 2009, Springer

   5. Calculus with Analytic Geometry by Howard Anton, John Wiley & Sons; 5th Edition

   6. Elementary vector analysis, with application to geometry and mechanics by C. E. Weatherburn; CBS Publishers, 2003