

Course Title	CALCULUS - II
Course Code	MPHY-102
Credit Hours	CH3
Pre- requisites	MPHY-101
Learning outcomes	The students would be presented to the vector calculus, the calculus of multivariable functions and double and triple integrals along with their applications.
Contents	<p>Vector and geometry of space: Coordinate systems: Rectangular, cylindrical, and spherical coordinates. Derivatives and integrals of vector-valued functions, Arc length, curvature, normal and binormal vectors, dot products, cross products, Line and plane in space.</p> <p>Conic sections: Curves in the Cartesian plane, Parametric representations, Polar coordinates, Tangents and normal, Properties of parabola, ellipse, and hyperbola, Polar equations of conics, Change of axes, The general equation of the second degree, Curve tracing, Analytical geometry of three dimensions, Angle between two lines, perpendicular lines; Equations of a plane in various forms; Perpendicular line to a plane, parallel planes, perpendicular planes; Equations of straight lines in various forms, plane through a line; Perpendicularity and parallelism of lines and planes; Equation of locus; Shortest distance between two lines; Examples of surfaces: Intercepts, traces, symmetry, sketching by parallel plane sections; Surfaces of revolution: Quadric surfaces, spheres, ellipsoids, paraboloids, hyperboloids, cylinders, cones; Curves in space, Area of surfaces of revolution.</p> <p>Partial derivatives: Limits and continuity composition, and chain rule; Directional derivatives and the gradient vector; Implicit function theorem for several variables; Maximum and minimum values, optimization problems; Lagrange multipliers.</p> <p>Multiple integrals: Double integrals over rectangular domains and iterated integrals; non-rectangular domains; Double integrals in polar coordinates; Triple integrals in rectangular, cylindrical, and spherical coordinates; Applications of double and triple integrals; Change of variables in multiple integrals.</p>
Teaching-learning Strategies	Classroom teaching / Lecturing

Assignments- Types and Number	Problem sheet: 3-4
Assessment and Examinations	Mid-Term Assessment: 35% Formative Assessment: (25%): It includes classroom participation, attendance, assignments and presentations, homework, attitude and behavior, hands-on-activities, short tests, quizzes etc. Final Term Assessment: 40%
Text Books	<ol style="list-style-type: none">1. Calculus by Thomas (13th Edition), Addison Wesley (2005)2. Calculus by H. Anton, I. Bevens, S. Davis (8th Edition), John-Wiley (2005)3. Calculus and Analytics Geometry by C. H. Edward and E.D Penney, Prentice Hall (1988)4. Calculus: Early Transcendentals by James Stewart5. Calculus by Ron Larson and Bruce H. Edwards6. Calculus: A Complete Course by Robert A. Adams and Christopher Essex.