Course Title	**MATHEMATICAL METHODS OF PHYSICS-II**
Course Code	**APHY-354**
Credit Hours	**CH3**
Pre- requisites	**MPHY-352**
Learning outcomes	To understand mathematical tool such as tensor analysis, group theory and complex analysis.
Contents	**Vector Integration and Theorem:** Line integrals, surface integrals, volume integrals Gauss's theorem, Green's Theorem and Stokes Theorem, **Potential Theory:** Scalar potential, vector potential, Gauss Law, Poisson's equation, Helmholtz's theorem, **Curvilinear Coordinates:** Orthogonal coordinates, Integrals in curvilinear coordinates, Differential operators in curvilinear coordinates, Circular cylindrical coordinates, spherical polar coordinates, **Tensor Analysis:** Cartesian tensors, First- and zero-order Cartesian tensors, second- and higher-order Cartesian tensors, the algebra of tensors, the quotient law, Kronecker delta δ_ij and Levi Civita tensor ε_ijk, Isotropic tensors, improper rotations and pseudo tensors, dual tensors, physical applications of tensors, integral theorems for tensors, non-Cartesian coordinates, the metric tensor, General coordinate transformations and tensors, relative tensors, derivatives of basis vectors and Christoffel symbols, covariant differentiation, vector operators in tensor form, absolute derivatives along curves, **Complex analysis:** Complex numbers, powers and roots, Sets in the Complex planes, Functions of a complex variables, Cauchy–Riemann equations, Exponential and Logarithmic functions, Contour Integrals, Cauchy-Goursat theorem, Independence of path, Cauchy's Integral formulas, Sequences and Series, Taylor series, Laurent Expansion, Zeros and Poles, Singularities, Residues and Residues Theorem, Evaluation of real Integrals.
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	1. Mathematical Methods for Physicists (7th Edition) by G. B. Arfken, H. J. Weber and F. E. Harris, Academic Press (2012) 2. A Guide to Mathematical Methods for Physicists by M. Petrini, G. Pradisi and A. Zaffaroni, World Scientific Press (2017) 3. Mathematical physics: A modern introduction to its foundations by S. Hassani, Sadri, Springer (2013) 4. Mathematics for physicists, by P. Dennery and A. Krzywicki Dover Publications (2012). 5. Mathematical methods for physics and engineering by K. F. Riley, M. P. Hobson, and S. J. Bence (3rd Edition), Cambrige (1999) 6. Mathematical Methods for Physicists: A Concise Introduction by T. L. Chow, Cambridge (2000) 7. Contemporary Abstract Algebra by J. A. Gallian (8th Edition), Cengage Learning (2013)