Teaching Plan

Name of the Faculty: Dr. Jasmeet Singh

Name of the Course :B.Sc. (H) Physics

Semester : IV Sec (if any) :

Title of the Paper :Mathematical Physics IV (PHHT-411)

Month	Topics Covered	References
January	**Matrices**: Addition and Multiplication of Matrices. Null Matrices. Diagonal, Scalar and Unit Matrices. Upper-Triangular and Lower-Triangular Matrices. Transpose of a Matrix. Symmetric and Skew-Symmetric Matrices. Conjugate of a Matrix. Hermitian and Skew-Hermitian Matrices. Singular and Non-Singular matrices. Adjoint of a Matrix. Inverse of a Matrix by Adjoint Method. Similarity Transformations. Orthogonal and Unitary Matrices. Trace of a Matrix. Inner Product. Eigen-values and Eigenvectors. Cayley-Hamiliton Theorem. Diagonalization of Matrices. Solutions of Coupled Linear Ordinary Differential Equations. Bilinear and Quadratic Forms. Functions of a Matrix.	➢ Vector Spaces and Matrices in Physics by M. C. Jain ➢ Matrices and Tensors in Physics by A.W.Joshi. ➢ Applied Mathematics for Engineers and Physicists, L. A. Pipes, L. R. Harvill
February	**Linear Vector Spaces**: Abstract Systems. Binary Operations and Relations. Introduction to Groups and Fields. Vector Spaces and Subspaces. Linear Independence and Dependence of Vectors. Basis and Dimensions of a Vector Space. Homomorphism and Isomorphism of Vector Spaces. Linear Transformations. Algebra of Linear Transformations. Non-singular Transformations. Representation of Linear Transformations by Matrices. **Partial Differential Equation:** General Solution of Wave Equation in 1 Dimension. Transverse Vibrations of Stretched Strings. Oscillations of Hanging Chain.	
March	**Partial Differential Equation:** Wave Equation in 2 and 3 Dimensions. Vibrations of Rectangular and Circular Membranes. Heat Flow in One, Two, and Three Dimensions. Heat Flow in Rectangular Systems of FiniteBoundaries. Temperature inside Circular Plate.	

April	**Partial Differential Equation:** Laplace Equation in Cartesian, Cylindrical and Spherical Coordinate Systems. Problems of Steady Flow of Heat in Rectangular and Circular Plate.	

Note : The tentative date of Assignment/test/Project may also be provided.

The schedule of Practical may also be provided

Teaching Plan

Name of the Faculty : Mr. GagandeepLongiany

Name of the Course :B.Sc. (H) Physics

Semester : IV Sec (if any) :

Title of the Paper : Numerical Analysis (PHHT- 414)

Month	Topics Covered	References
January	**Solution of Algebraic and Transcendental Equations** (1) Fixed-Point Iteration Method, (2) Bisection Method, (3) Secant Method, (4) Newton-Raphson Method, and (5) Generalized Newton's Method. Comparison and Error Estimation. **Matrices and Linear System of Equations** Solution of Linear Equations :- (1) Gauss Elimination Method and (2) Gauss-Seidel Iterative Method. Eigenvalues and Eigenvectors :- Computation of Eigenvalues and Eigenvectors of Matrices by using Iterative Methods.	• Introductory Methods of Numerical Analysis 4th Ed. By S.S. Sastry (PHI Learning Pvt.Ltd., 2006) • Numerical Mathematical Analysis by James D. Scarborough (sisth Edition), Oxford & IBH Publishing • Elementary Numerical Analysis By Kendall E. Atkinson (Wiley, 1985) • Numerical Methods for Scientists and Engineers By Richard Wesley Hamming • Schaum's Outline of Programming with C++, McGraw-Hill; 2nd Edition • Numerical Recipes in C++: The Art of Scientific Computing , Cambridge UniversityPress; 2nd Edition.
February	**Curve Fitting, B-Splines and Approximation** Curve Fitting by Least Square Methods : (1) Fitting a Straight Line. (2) Non-Linear Curve Fitting : (a) Power Function, (b) Polynomial of nth Degree, and (c) Exponential Function. (3) Linear Weighed Least Square Approximation.	

	Orthogonal Polynomials. Gram-Schmidt Orthogonalization Process. **Interpolation** Interpolation :- Forward and Backward Differences. Symbolic Relation. Differences of Polynomial. Newton' Forward and Backward Interpolation Formulas. Divided Differences. Newton's General Interpolation Formula. **Numerical Differentiation** Numerical Differentiation using (1) Newton's Interpolation Formulas and (2) Cubic Spline Method. Errors in Numeric Differentiation. Maximum and Minimum Values of a Tabulated Function.	
March	**Numerical Integration** General Quadrature Formula. Trapezoidal Rule. Simpson's 1/3 and 3/8 Rules. Weddle's Rule. Gauss Quadrature Formulas : (1) Gauss-Hermite and (2) Gauss-Legendre Formulas. **Solution of Ordinary Differential Equations (ODE's)** First Order ODEs :- Solution of Initial Value Problems : (1) Euler's Method, (2) Modified Eulers's Method, (3) Runge-Kutta Method of Second Order with Error Estimation. Second Order ODEs. :- Solution of 2-Point Boundary Value Problems. Finite Difference Approximation of Derivatives. Finite Differnce Method.	
April	**Curve Fitting, B-Splines and Approximation** Cubic B-Splines. Least-Squares Solution. Representation of BSplines through Divided Differences. Approximation of Functions. Chebyshev Polynomials. **Errors and Iterative Methods** Truncation and Round-off Errors. Floating Point Computation. Overflow and Underflow. Single and Double Precision Arithmetic.	

	Iterative Methods.	

Note : The tentative date of Assignment/test/Project may also be provided.

The schedule of Practicals may also be provided

Teaching Plan

Name of the Faculty :Dr.SmitaKorpal

Name of the Course :B.Sc. Physical Sciences

Semester : IV Sec (if any) :

Title of the Paper :Electricity, Magnetism and Electromagnetic Theory

Month	Topics Covered	References
January	**ELECTROSTATICS** **Electric Field:** Concept of electric field lines and electric flux, Gauss law, application to linear, plane, and spherical charge distributions. Conservative nature of E, irrotational field. Electric Potential: Concept of Electric potential, relation between electric potential and electric field, potential energy of a system of charges.	• Fundamentals of Electricity and Magnetism By Arthur F. Kip • Electricity and Magnetism by J.H.Fewkes and John Yarwood. VOL I • Electricity and Magnetism By Edward M. Purcell • Electricity and Magnetism by D.C. Tayal • Electromagnetics by Joseph A.Edminister 2nd ed. • Introduction to Electrodynamics 3rd ed. By David J. Griffiths
February	**Electric Potential:** Energy density in an electric field, calculation of potential from electric field for a spherical charge distribution. **MAGNETOSTATICS:** Concept of magnetic field B and magnetic flux, Biot-Savart"s law, B due to a straight current carrying conductor, orce on a point charge in a magnetic field. Properties of B, curl and divergence of B, solenoidal field. Integral form of Ampere's Law, Applications of Ampere's law, Fields due to straight, circular and solenoidal currents.	

March	**Magnetostatics:**Energy stored in magnetic field, magnetic energy in terms of current and inductance. Magnetic force between two current carrying conductors. Magnetic field intensity. **Ballistic Galvanometer:** Torque on a current loop in a uniform magnetic field, working principle of BG, current and charge sensitivity, electromagnetic damping, critical damping resistance. **ELECTROMAGNETIC INDUCTION and ELCTROMAGNETIC WAVES** Faraday's laws of induction, Lenz's law, self and mutual induction.	
April	**ELECTROMAGNETIC INDUCTION and ELCTROMAGNETIC WAVES** Continuity Equation, modification of Ampere's law, displacement current, Maxwell's equation in vaccum and dielectric medium, boundary conditions, plane wave equation, transverse nature of em waves, velocity of light in vaccum and in medium, polarization , reflection and transmission. Polarization of em waves, Brewster's angle, description of linear, circular and elliptical polarization.	

Note : The tentative date of Assignment/test/Project may also be provided.

The schedule of Practicals may also be provided