**CURRICULUM PLAN 2024-25**

Odd Semester: I, III, V

**Mr. Kapil Kumar**

Department of Physics

**B.Sc. (H) – I Year, I Sem,**

**Core Paper: Mathematical Physics-1**

|  |  |  |  |
| --- | --- | --- | --- |
| Content | Allocation of Lectures | Month-wise Schedule followed | Tutorial/assignment/  presentation etc |
| **Mathematical Physics** | | |  |
| **Unit 1:**  **Functions**: Plotting elementary functions and their combinations, interpreting graphs of functions using the concepts of calculus, Taylor’s series expansion for elementary  functions.  **Ordinary Differential Equations**:  First-order differential equations of degree one and  those reducible to this form, Exact and Inexact equations, Integrating Factors, Applications  to physics problems | 8 | 30-Aug to 20-Sep | Syllabus Overview  Reference books  Problem-solving  Derivations and Numerical. |
| **Unit 1:**  Higher-order linear homogeneous differential equations with constant coefficients,  Wronskian and linearly independent functions. Non-homogeneous second-order linear  differential equations with constant coefficients, complementary function, particular integral  and general solution, Determination of particular integral using method of undetermined  coefficients and method of variation of parameters, Cauchy-Euler equation, Initial value  problems. Applications to physics problems | 10 | 21-Sept to 12-Oct | Derivations and  Numericals  Class test on unit end  Discussion of  Important questions |
| **Unit 2:**  **Vector Algebra:** Transformation of Cartesian components of vectors under rotation of the  axes, Introduction to index notation, and summation convention. Product of vectors - scalar  and vector product of two, three, and four vectors in index notation using 6;; and &;j, (as  symbols only — no rigorous proof of properties). Invariance of scalar product under rotation  transformation. | 6 | 13-Oct to 26-Oct | Derivations and  Numericals  Discussion of  Important questions  Home Register Checking |
| **Unit 2:**  **Vector Differential Calculus:** Functions of more than one variable, Partial derivatives,  chain rule for partial derivatives. Scalar and vector fields, concept of directional derivative,  the vector differential operator v, the gradient of a scalar field and its geometrical  interpretation. Divergence and curl of a vector field and their physical interpretation.  Laplacian operator. Vector identities. | 6 | 27-Oct to 12-November | Derivations and  Numericals |
| **Unit 3: Vector Integral Calculus:** Integrals of vector-valued functions of a single scalar variable.  Multiple integrals, Jacobian, Notion of infinitesimal line, surface and volume elements.  Line, surface, and volume integrals of vector fields. Flux of a vector field. Gauss divergence  theorem, Green’s and Stokes’ Theorems (no proofs), and their applications. | 8 | 13 November to 03 December | Derivation, Numerical & Revision. Solving previous year's Question papers. |
| **Unit 3:** Probability Distributions: Discrete and continuous random variables, Probability  distribution functions, Binomial, Poisson, and Gaussian distributions, and Mean and variance of  these distributions. | 07 | 03 December to 28 December | Derivation, Numerical & Revision. Solving previous year's Question papers. |