**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**

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| 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 elementaryfunctions.**Ordinary Differential Equations**: First-order differential equations of degree one andthose reducible to this form, Exact and Inexact equations, Integrating Factors, Applicationsto physics problems | 8 | 30-Aug to 20-Sep | Syllabus OverviewReference booksProblem-solvingDerivations and Numerical. |
| **Unit 1:** Higher-order linear homogeneous differential equations with constant coefficients,Wronskian and linearly independent functions. Non-homogeneous second-order lineardifferential equations with constant coefficients, complementary function, particular integraland general solution, Determination of particular integral using method of undeterminedcoefficients and method of variation of parameters, Cauchy-Euler equation, Initial valueproblems. Applications to physics problems | 10 | 21-Sept to 12-Oct | Derivations andNumericalsClass test on unit endDiscussion ofImportant questions |
| **Unit 2:** **Vector Algebra:** Transformation of Cartesian components of vectors under rotation of theaxes, Introduction to index notation, and summation convention. Product of vectors - scalarand vector product of two, three, and four vectors in index notation using 6;; and &;j, (assymbols only — no rigorous proof of properties). Invariance of scalar product under rotationtransformation. | 6 | 13-Oct to 26-Oct | Derivations andNumericalsDiscussion ofImportant questionsHome 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 geometricalinterpretation. Divergence and curl of a vector field and their physical interpretation.Laplacian operator. Vector identities. | 6 | 27-Oct to 12-November | Derivations andNumericals |
| **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 divergencetheorem, 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, Probabilitydistribution functions, Binomial, Poisson, and Gaussian distributions, and Mean and variance ofthese distributions. | 07 | 03 December to 28 December | Derivation, Numerical & Revision. Solving previous year's Question papers. |