<u>**CURRICULUM PLAN of Prof. Rachana Kumar**</u>
(Odd Semester, 2021-22)

<u>**B. Sc. (H) Physics, I Year**</u>

Semester-I

I)   **Name of Paper & Code :–CBCS, CC-I: Mathematical Physics-I (32221101), 4 Periods per week**

Contents	Allocation of Lectures	Month wise schedule to be followed	Tutorial/Assignment/ Presentation etc.
Vector Analysis **Vector Algebra**: Scalars and vectors, laws of vector algebra, scalar and vector product, triple scalar product, interpretation in terms of area and volume, triple cross product, product of four vectors. Scalar and vector fields.	5 lectures	23rd of November –Last week	• Online classes • Syllabus Overview • Reference Books • Problem solving
Vector Differentiation: Ordinary derivative of a vector, the vector differential operator. Directional derivatives and normal derivative. Gradient of a scalar field and its geometrical interpretation. Divergence and curl of a vector field. Laplacian operator. Vector identities.	8 Lectures	Last week Nov-mid December	• Course progression • Related Problems • Assignment • Home Register overview • Student's difficulties
Vector Integration: Ordinary Integrals of Vectors. Double and Triple integrals, Jacobian. Notion of infinitesimal line, surface and volume elements. Line, surface and volume integrals of Scalar and Vector fields. Flux of a vector field. Gauss' divergence theorem, Green's and Stokes Theorems, their verification (no rigorous proofs) and applications.	14 Lectures	Mid-December-third week of January ,22	• Online classes • Related Problems and applications of theorems • Practice Register checking • Class test • Previous Year's Question Papers discussion
Orthogonal Curvilinear Coordinates: Orthogonal Curvilinear Coordinates. Derivation of Gradient, Divergence, Curl and Laplacian in	6 Lectures	Last week of January	• Derivations • Revision session • Student's difficulties

Cartesian, Spherical and Cylindrical Coordinate Systems.			
First Order Differential Equations: First order differential Equations: Variable separable, homogeneous, non-homogeneous, exact and inexact differential equations and Integrating Factors. Application to physics problems.	5 Lectures	First week of February	• Related Problems • Group Discussion
Second Order Differential Equations: Homogeneous Equations with constant coefficients. Wronskian and general solution. Particular Integral with operator method, method of undetermined coefficients and method of variation of parameters. Cauchy-Euler differential equation and simultaneous differential equations of First and Second order.	13 lectures	2nd week of February to last week	• Problems and their applications to Physics
Calculus **Functions**: Recapitulate the concept of functions. Plot and interpret graphs of functions using the concepts of calculus.	2 Lectures	Last week of February	• Related Problems • Revisions • Assignment • Home Register checking
Probability and statistics: Independent and dependent events, Conditional Probability. Bayes' Theorem, Independent random variables, Probability distribution functions, special distributions: Binomial, Poisson and Normal. Sample mean and variance and their confidence intervals for Normal distribution.	7 Lectures	1st week of March 2022- onset of practical examinations	• Revision • Overview and discussions of previous years question papers