

**FOUR YEAR UNDERGRADUATE PROGRAM (2024 – 28)**  
**DEPARTMENT OF PHYSICS**  
**COURSE CURRICULUM**

<b>PART-A: INTRODUCTION</b>			
Program: Bachelor in Science (Diploma /Degree/Honors)		Semester - IV	Session: 2024-2025
1	Course Code	PHSE-02	
2	Course Title	Mathematical Physics-I	
3	Course Type	Discipline Specific Elective	
4	Pre-requisite (if, any)	As per Program	
5	Course Learning Outcomes(CLO)	<ul style="list-style-type: none"> <li>➤ Revise and apply the knowledge of calculus, vectors, vector calculus, probability and probability distributions in various cases.</li> <li>➤ Illustrate proficiency in writing and solving Differential equation and solving them for a given physical system.</li> <li>➤ Apply and interpret the curvilinear coordinates in problems with spherical and cylindrical symmetries.</li> <li>➤ Use Dirac Delta function for various physical situation, especially in quantum mechanical approaches.</li> </ul>	
6	Credit Value	4 Credits	Credit = 15 Hours -learning & Observation
7	Total Marks	Max. Marks: 100	Min Passing Marks: 40

**PART -B: CONTENT OF THE COURSE**

Total No. of Teaching-learning Periods(01 Hr. per period) – 60 Periods (60 Hours)		
Unit	Topics (Course Contents)	No. of Period
<b>I</b>	<p><b>Calculus:</b>  <b>Recapitulation:</b> Limits, continuity, average and instantaneous quantities, differentiation. Plotting functions, Intuitive ideas of continuous, differentiable, etc. functions and plotting of curves. Approximation: Taylor and binomial series (statements only).  <b>Calculus of functions of more than one variable:</b> Partial derivatives, exact and inexact differentials. Integrating factor, with simple illustration. Constrained Maximization using Lagrange Multipliers.  <b>Origin and Evolution of Mathematical concepts in Ancient India:</b> Bhaskaracharya, the Inventor of Calculus: some examples on calculus</p>	16
<b>II</b>	<p><b>First Order and Second Order Differential equations:</b> First Order Differential Equations and Integrating Factor. Homogeneous Equations with constant coefficients. Wronskian and general solution. Statement of existence and Uniqueness Theorem for Initial Value Problems. Particular Integral.  <b>Orthogonal Curvilinear Coordinates:</b>                      Orthogonal Curvilinear Coordinates. Derivation of Gradient, Divergence, Curl and Laplacian in Cartesian, Spherical and Cylindrical Coordinate Systems.</p>	16

<b>III</b>	<b>Introduction to probability:</b> Independent random variables: Probability distribution functions; binomial, Gaussian, and Poisson, with examples. Mean and variance. Dependent events: Conditional Probability. Bayes' Theorem and the idea of hypothesis testing.	<b>15</b>
<b>IV</b>	<b>Dirac Delta function and its properties:</b> Definition of Dirac delta function. Representation as limit of a Gaussian function and rectangular function. Properties of Dirac delta function. Problems based on dirac-delta function and its application	<b>13</b>
<b>Keywords</b>	Calculus, Lagrange Multipliers, Homogeneous Equations, Particular Integral, Probability distribution, Dependent events, Dirac delta function	

*Signature of Convener & Members (CBoS):*

Handwritten signatures of the Convener and Members of the CBoS. The signatures are arranged in two rows. The top row contains five signatures, and the bottom row contains two signatures. The date '18/6/14' is written below the fourth signature in the top row.