I M.Sc. (PH)	MATHEMATICAL PHYSICS I	PPH12A
SEMESTER - I		HRS/WK-5
CORE – II		CREDIT-4

OBJECTIVES:

To develop the ability to solve Linear and Non-linear differential Mathematical problems.

COURSE OUTCOMES (CO):

CO1: Give the basic knowledge of vector spaces
CO2: Study the complex variables
CO3: Understand the Fourier Series And Laplace Transforms
CO4: Under various differential equations
CO5: Understand the concepts of special functions

Relationship Matrix Course Outcomes, Programme Outcomes and Programme Specific Outcomes

SEMESTER - I	COURSE CODE: PPH12A					COURSE TITLE:MATHEMATICAL PHYSICS I						Hours: 5	Credit: 4
Course Outcomes COs	Programme Outcomes POs					Programme Specific Outcomes PSOs						Mean Score of CO's	
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6		
CO1	3.5	2	4.1	3.4	3.5	2.5	3	3.4	4	3.2	3.2	3.25	
CO2	3.4	3	3.6	3	3.5	2.8	4	3.6	3.7	2.1	3.5	3.29	
CO3	3.5	4	3.5	2.8	3	3	3.5	3.5	3.4	4	3.3	3.40	
CO4	3.4	3.6	3	4.2	3.7	3.5	3.4	2.8	3.4	3.7	3.6	3.48	
CO5	4.3	3.6	3.5	3.2	3.6	2.8	3.5	3.2	4.2	3.5	3.7	3.55	
Mean Overall Score												3.39	

Result: The Score for this course is 3.39 (High)

Association	1-20%	21-40%	41-60%	61-80%	81-100%
Scale	1	2	3	4	5
Interval	0.0-1.0	1.1-2.0	2.1-3.0	3.1-4.0	4.1-5.0
Rating	Very Poor	Poor	Moderate	High	Very High

This course is having **High** association with Programme Outcome and Programme Specific Outcome.

UNIT - I **(15 Hours)**

Linear Algebra: Linear equations - Linear combinations – linear dependence and

independence - Vector spaces: real and complex - subspace, basis, dimension - Linear transformations - Inner product, norm, Orthogonality, - Cauchy-Schwarz inequality - Orthonormal basis - Gram-Schmidt orthogonalization–solution of linear equations by determinants (Cramer's rule)-Transformation of vectors and matrices - Similarity of linear transformations- Diagonalization of a matrix - completeness. – Problems.

UNIT - II **(15 Hours)**

Complex Variables: Complex variable theory - Single and multivalued functions - The Cauchy-Riemann differential equations - Cauchy's integral theorem and integral formula - Residue and Cauchy's residue theorem - Liouville's theorem – Applications of the evaluation of definite integrals. – Problems.

UNIT - III **(15 Hours)**

Fourier series: Fourier series -– Dirichlet conditions – Even function and odd function-Half-wave expansions – arbitrary period—Parseval's theorem- Application of Fourier series in Harmonic Analysis– Problems.

UNIT – IV **(15 Hours)**

Integral transforms: Fourier integral transforms - Fourier Sine and Cosine transformation - Laplace transform –change of scale property- first and second (Heaviside's) shifting theorems - Inverse Laplace transforms –some important formulae- First and second shifting property- Laplace transformation for solving differential equations of a function. – Problems.

UNIT - V **(15 Hours)**

Differential Equations: Linear ordinary differential equations of first order and second order – Degree of ordinary differential equations – Linear differential equation - General solution and particular solution – Method of solution – Higher order differential equation – Homogeneous linear differential equation – Linear differential equation of second order. – Problems.

TEXT BOOKS:

1. H.k.dass, Dr Rama Verma, Mathematical Physics.2016
2. Sathyaprakash. R, Mathematical Physics.2014
3. P K Chattopadhyay Mathematical Physics, 2013.
4. Spiegel, Fourier Laplace Transforms, Schaum's Outline Series.2014

REFERENCE BOOKS:

1. Kreyszig E, Advanced Engineering Mathematics.2011
2. Howard Anton, Elementary Linear Algebra, John Wiley Sons2000
3. Engineering Mathematics-series, Dr. M. K. Venkataraman- The National publishing company-Madras.1992

I M.Sc. (PH)	MATHEMATICAL PHYSICS - II	PPH22A
SEMESTER – II		HRS/WK-5
CORE – V		CREDIT-4

OBJECTIVES:

To understand the advanced concept of group theory, partial differential equations, probability and statistics.

COURSE OUTCOMES (CO):

CO1: To give the basic knowledge of tensors
CO2: Get the acquire knowledge of group theory
CO3: Understand the concepts partial differential equation
CO4: Study numerical analysis
CO5: Understand the concepts of probability and statistics

Relationship Matrix Course Outcomes, Programme Outcomes and Programme Specific Outcomes

SEMESTER –II	COURSE CODE: PPH22A					COURSE TITLE: MATHEMATICAL PHYSICS- II						Hours: 5	Credit: 4
Course Outcomes COs	Programme Outcomes POs					Programme Specific Outcomes PSOs						Mean Score of CO's	
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6		
CO1	5	5	5	5	4	5	5	5	5	5	4	4.818	
CO2	5	5	5	5	4	5	5	5	5	5	4	4.818	
CO3	5	5	5	5	4	5	5	5	5	5	4	4.818	
CO4	5	5	5	5	4	5	5	5	5	5	4	4.818	
CO5	5	5	5	5	4	5	5	5	5	5	4	4.818	
Mean Overall Score												4.818	

Result: The Score for this course is 4.81 (Very High)

Association	1-20%	21-40%	41-60%	61-80%	81-100%
Scale	1	2	3	4	5
Interval	0.0-1.0	1.1-2.0	2.1-3.0	3.1-4.0	4.1-5.0
Rating	Very Poor	Poor	Moderate	High	Very High

This course is having **VeryHigh**association with Programme Outcome and Programme Specific Outcome.

UNIT - I **(15 Hours)**

Tensors: Tensors Under Generalized Coordinate Transformations - Definition of tensor; rank,

symmetric tensors, contraction, quotient rule; tensors with zero components, tensor equations, metric tensors and their determinants; pseudo tensors; transformation of $\varepsilon^{ijk}/(g)^{1/2}$-Problems

UNIT - II **(15 Hours)**

Group Theory: Definition of groups, subgroups and conjugate classes - Symmetry elements, Transformation, Matrix representation - Point groups - representation of a group - Reducible and irreducible representations - Orthogonality theorem - character of a representation - character Table C2v and C3v – Application to IR and Raman active vibrations of XY3 molecules - Symmetry rotations SO(2) and SO(3) groups - Symmetry Unitary SU(2) and SU(3) groups. -Problems

UNIT - III **(15 Hours)**

Partial Differential Equation: Formation of Partial differential equations – elimination of arbitrary constants – elimination of arbitrary functions –Singular integral – General integral - Standard types of first order equations – Linear Partial Differential equation of Second and higher order with constant coefficients. One dimensional wave equations, heat equation-Problems

UNIT - IV **(15 Hours)**

Special Functions: Gamma and beta functions - Legendre, Bessel, Hermite and Laguerre equations - Generating functions - Series solutions and recurrence relations for Legendre, Bessel, Hermite and Laguerre equations - Physical applications. -Problems

UNIT - V **(15 Hours)**

Probability and Statistics: Events - Sample Space - Mathematical and Statistical definitions of Probability - Random variables – Distribution function – Discrete random variable – Continuous random variable – Continuous distribution function –Mathematical expectation and variance- Poisson distribution - Normal distribution – Properties of normal distribution – Mean, Median, Mode. -Problems

TEXT BOOKS:

1. Engineering Mathematics, M.K.Venkataraman, National Publications , Chennai (2009)
2. Fundamentals of Mathematical Statistics by S.C.Gupta, V.K.Kapoor, Sultan Chand and Sons , 11th edition 1982
3. Statistical methods by S.P.Gupta – Sultan Chand.2011
4. Statistics (Theory and Practice) by R.S.N.Pillai& V. Bagavathy -S.Chand& Co.

REFERENCE BOOKS:

1. Kreyszig E, Advanced Engineering Mathematics.2011
2. Reily K.F Hobson M.P. and Bence S.J, Mathematical methods 2006