



Gyanmanjari
Innovative University

Course Syllabus
Gyanmanjari Science College
Semester-3(B.Sc.)

Subject: Mathematical Physics I- BSCPH13305

Type of course: Major

Prerequisite: Idea of symmetry in functions, Vector calculus basics, Trigonometry, Green's theorem

Rationale: This course has been designed to make the students know about basic principles of Physics. The students learn fundamentals of physics understand the physics applications in real world and developing critical thinking skills. It helps students to develop problem-solving abilities and prepare them to shape career in advanced physics. Ultimately, pursuing a B.Sc. in Physics offers a combination of intellectual stimulation, practical skills, and versatile career opportunities. It equips you with a deep understanding of the physical world and provides a strong foundation for further education or a wide range of professional endeavors

Teaching and Examination Scheme:

Teaching Scheme			Credits	Examination Marks					Total Marks
CI	T	P	C	SEE		CCE			
				Theory	Practical	MSE	LWA/V	ALA	
3	0	2	4	75	25	30	20	50	200

Legends: CI-Class Room Instructions; T – Tutorial; P - Practical; C – Credit; SEE - Semester End Evaluation; MSE- Mid Semester Examination; LWA - Lab Work Assessment; V – Viva voice; CCE-Continuous and Comprehensive Evaluation; ALA- Active Learning Activities.

3 Credits * 25 Marks = 75 Marks (each credit carries 25 Marks) Theory

1 Credits * 25 Marks = 25 Marks (each credit carries 25 Marks) Practical

SEE 100 Marks will be converted in to 50 Marks

CCE 100 Marks will be converted in to 50 Marks

It is compulsory to pass in each individual component.



Continuous Assessment:

Sr. No	Active Learning Activities	Marks
1	Report writing Students have to Write a case study on "Application of Fourier series in rectifier circuits or heat conduction." and upload it to GMIU Web Portal.	10
2	Minor project Students prepare a working model based on any topic related to syllabus Prepare a small video on your project and upload it to GMIU Web Portal.	10
3	Draw and explain Students will Draw a flowchart linking Newton's laws, D'Alembert's principle, Lagrangian mechanics Then upload in PDF format on GMIU web Portal (10 MCQs).	10
4	Video Presentation Student will prepare short video on the topic given by the faculty and upload on the GMIU web portal.	10
5	Attendance Student should present in class room during lecture.	10
Total		50

Course Content:

Mathematical Physics I- BSCPH13305



Unit No	Course content	Hrs.	% Weightage
1	Chapter:1 Fourier Series Definition of Fourier series, Dirichlet's conditions for Fourier series, Advantages of Fourier Series, Evaluation of coefficient of Fourier series, Graphical Representation of a Function, Cosine & Sine series (Even and Odd function), Change of interval in Fourier series, Complex representation of Fourier series, Advantages of Fourier series, Physical Application of Fourier series: (1) Square wave (2) Full wave rectifier (3) A saw-tooth wave (4) A triangular wave, Examples.	10	25
2	Chapter:2 Lagrange Formulation and Applications Constraints, Generalized Coordinates, D'Alembert's Principle, Lagrange Equations, Importance of Lagrange function, A general expression for kinetic energy, Symmetries and laws of conservation, Cyclic co-ordinates, Velocity dependent potential, Rayleigh's dissipation function, Motion of a particle using Cartesian co-ordinates, Motion of a particle using polar co-ordinates, Equation of motion of one dimension harmonic oscillator, Atwood's machine, Simple pendulum with,.	10	25
3	Chapter:3 Complex Numbers Definition of Complex number, Addition Complex number, Subtraction Complex number, Multiplication Complex number, Division Complex number, complex numbers representation in argand plane and polar plane, Conjugate of complex number, Modulus and Argument, Types of Complex Numbers, Square Root of a Complex Number, De-Moivre's Theorem, Roots of a Complex Number, Hyperbolic Functions, Examples,	12	25
4	Chapter: 4 Complex Integration Cauchy Riemann Condition, Definition of Green's Theorem, Cauchy's integral theorem for simply and multiply connected region, Cauchy's integral formula, Poisson integral formula for a half plane, Taylor theorem, Taylor series, Examples,	13	25

Suggested Specification table with Marks (Theory):75

Distribution of Theory Marks (Revised Bloom's Taxonomy)						
Level	Remembrance (R)	Understanding (U)	Application (A)	Analyze (N)	Evaluate (E)	Create (C)
Weightage	20 %	30%	30%	-	20%	-

Note: This specification table shall be treated as a general guideline for students and teachers. The actual distribution of marks in the question paper may vary slightly from above table.

Course Outcome:

After learning the course, the students should be able to:	
CO1	Explain the concept of Fourier series and state Dirichlet's conditions for expansion of periodic functions.
CO2	Derive Lagrangian equations of motion for simple systems.
CO3	Represent complex numbers on the Argand plane and in polar form.
CO4	State and apply Green's theorem in the plane.

List of Practical

Sr. No	Descriptions	Unit No	Hrs.
1	To determine wattage and temperature of a given lamp	3	4
2	To verify tangent's law using tangent galvanometer	3	2
3	To determine low resistance using projection method	2	2
4	To determine magnetic moment and pole strength using deflection magnetometer.	3	2
5	To study full wave rectifier	3	2
6	To determine Impedance of coil using series L-R circuit.	2	2
7	To study characteristics of thermistor	4	2
8	To study forward characteristics of a P-N Junction diode.	4	4
9	Evaluation of Capacitance of Capacitor.	1	4
10	Verification of Truth tables of AND, OR, NOT logic gates using discrete components	1	2
		Total	30

Instructional Method:

The course delivery method will depend upon the requirement of content and need of students. The teacher in addition to conventional teaching method by black board, may also use any of tools such as demonstration, role play, Quiz, brainstorming, MOOCs etc.

From the content 10% topics are suggested for flipped mode instruction.

Students will use supplementary resources such as online videos, NPTEL/SWAYAM videos, e-courses, Virtual Laboratory

The internal evaluation will be done on the basis of Active Learning Assignment

Practical/Viva examination will be conducted at the end of semester for evaluation of performance of students in laboratory.

References Books:

- 1) Mathematical Physics by P. K. Chatopadhyay (Wiley Eastern Limited)
- 2) Mathematical Physics by S. Chand
- 3) Mathematical Physics by Mary Bose
- 4) Mathematical Physics by Rajput
- 5) Principle of electronics by V.K. Mehta
- 6) Advanced practical physics by Chauhan and Singh
- 7) B.Sc. practical physics by C L Arora