DEPARTMENT OF PHYSICS
LESSION Plan
Session 2023-24
SEMESTER – II

Name of Teacher: Dr. Goutam Biswas

Paper Allotted: Minor-2 (Theory and lab), 2nd Semester (Hons.) [Mechanics Lab]

Month	Paper	Topic	No of classes
May 2024 04.05.2024	*Electricity and Magnetism (Minor-2)*	**Magnetostatics:** [Part -A] Biot-Savart's Law and its applications --- Straight conductor, Circular Coil, Solenoid carrying current. Divergence and Curl of Magnetic fields. Magnetic Vector potential. Ampere's circuital law.	04
	Electricity and Magnetism (Minor-2) Lab	**Practical:** 1] To study response curve of a series LCR circuit and determine its (a) Resonance frequency, (b) Impedance at resonance, (c) Quality factor Q, and (d) Band width 2] To Determine an Unknown Low resistance using Carey Foster's Bridge.	02
	Mechanics Lab *(Sem2 Major Students)*	1] To determine the value of 'g' using Bar Pendulum 2] To determine the value of 'g' and velocity for a freely falling body using Digital Timing Technique. 3] To determine the Young's Modulus by Flexure method	04
June 2024	*Electricity and Magnetism Minor -2 (semester -2)*	**Linear Network:** Impedance of L, C, R and their combinations, Thevenin & Norton's Theorem. Maximum Power transfer theorem and Superposition theorem. Anderson's bridge.	04
	Electricity and Magnetism (Minor-2) Lab	**Practical:** 3]To verify the Thevenin and Norton theorems 4]To verify Superposition and Maximum Power Transfer Theorems. 5]To determine Self-Inductance of a coil by Anderson's Bridge.	04
	Mechanics Lab *(Sem2 Major Students)*	4] To determine the co-efficient of viscosity of water by capillary flow method (Poiseuille's method) 5] To determine the moment of Inertia of a regular body using another auxiliary body and cradle suspended by a metallic wire.	03
July 2024	*Electricity and Magnetism (Minor-2)*	**Magnetic properties of Materials:** [Part -B] Magnetic intensity, magnetic induction, permeability, magnetic susceptibility. Brief Introduction of dia, – para- and ferro-magnetic materials.	04

	Electricity and Magnetism (Minor-2) Lab	6] To determine an unknown Low Resistance using potentiometer. 7] Measurement of field Strength B and its variation in a solenoid (determine dB/dx)	04
	Mechanics Lab *(Sem2 Major Students)*	6] To determine the Modulus of Rigidity of a wire by a torsional pendulum. 7] To determine the value of 'g' using Kater's Pendulum.	03
August 2024 06.08.2024	*Electricity and Magnetism (Minor-2)*	***Electromagnetic Induction*** Faraday's Law of electromagnetic induction, Lentz's Law, Self and Mutual inductance, L of single coil, M of two coils. Energy stored in magnetic field	03
		Internal Examination (Major and Minor students)	01
20.08.2024		END SEMESTER EXAMINATION	
Total Classes			36

Name of Teacher: Dr. Saurish Chakrabarty

Paper Allotted: DS2: Mechanics, SEC2: Computational Physics Skills

Month	Paper	Topic	No of classes
May 2024 (04.05.2024)	DS2	● **Fundamentals of Dynamics** ○ **Reference frames – Inertial frames** ○ **Review of Newton's Laws of Motion** ○ **Galilean transformations** ○ **Galilean invariance** ○ **Momentum of variable-mass system** ■ **motion of rocket** ○ **Dynamics of a system of particles** ■ **Centre of Mass** ■ **Principle of conservation of momentum** ○ **Impulse**	6
	SEC2	● **Scientific Programming** ○ **Some fundamental Linux Commands** ○ **Basic elements of FORTRAN 90** ■ **Character Set, Constants and their types, Variables and their types, Keywords, Variable Declaration and concept of instruction and program** ■ **Operators: Arithmetic, Relational, Logical and Assignment Operators**	4
June 2024	DS2	● **Work and Energy** ○ **Work and Kinetic Energy Theorem** ○ **Conservative and non- conservative forces** ○ **Potential Energy** ■ **Qualitative study of one-dimensional**	8

		motion from potential energy curves ■ **Stable and unstable equilibrium** ■ **Elastic potential energy** ■ **Force as gradient of potential energy** ■ **Work and Potential energy** ○ **Work done by nonconservative forces** ○ **Law of conservation of Energy** ○ **First Internal Assessment Examination** ● **Collisions** ○ **Elastic and inelastic collisions between particles** ○ **Centre of Mass and Laboratory frames**	
	SEC2	● **Scientific Programming (continued)** ○ **Basic elements of FORTRAN 90 (continued)** ■ **Expressions: Arithmetic, Relational, Logical, Character and Assignment Expressions** ■ **Statements: I/O Statements, Executable and Non-Executable Statements** ■ **Layout of Fortran 90/95 or C++ Program, Format of writing Program and concept of coding, Initialization and Replacement Logic** ■ **Examples from physics problems.** ○ **Control Statements** ■ **Types of Logic (Sequential, Selection, Repetition)** ■ **Branching Statements, Looping Statements, Jumping Statements** ■ **Subscripted Variables (Arrays: Types of Arrays, DIMENSION Statement, Reading and Writing Arrays)** ■ **Functions and Subroutines (Arithmetic Statement Function, Function Subprogram and Subroutine)** ■ **File Handling** ■ **Examples from physics problems.**	**12**
July 2024	**DS2**	● **Rotational Dynamics** ○ **Angular momentum of a particle and system of particles** ○ **Torque** ○ **Principle of conservation of angular momentum** ○ **Rotation about a fixed axis** ○ **Moment of Inertia** ○ **Perpendicular axes theorem and parallel axes theorem** ○ **Applications in calculations of moment of inertia for rectangular, cylindrical and spherical bodies** ○ **Kinetic energy of rotation** ○ **Motion involving both translation and rotation** ● **Second Internal Assessment** ● **Extra Classes for Slow Learners**	**10**

	SEC2	• **Scientific word processing: Introduction to LaTeX** ○ **TeX/LaTeX word processor, preparing a basic LaTeX file, Document classes, Preparing an input file for LaTeX, Compiling LaTeX File, LaTeX tags for creating different environments, Defining LaTeX commands and environments, Changing the type style, Symbols from other languages** ○ **Equation representation: Formulae and equations** ○ **Figures and other floating bodies** ○ **Lining in columns: Tabbing and tabular environments** ○ **Generating table of contents** ○ **Bibliography** ○ **Index and glossary** ○ **List making environments** ○ **Fonts, Picture environment and colors, errors**	12
06.08.2024		**Internal Examination &** **Class for Slow Learners**	3
20.08.2024		**END SEMESTER EXAMINATIONS**	
Total Classes			55

Name of Teacher: Dr. Atanu Nandy

Paper Allotted: DS -2 – Mechanics-I (Theory), SEC -2 – Computational Physics, Minor -2 – Electricity and Magnetism (Theory)

Month	Paper	Topic	No. of classes
May 2024 (04.05.2024)	**DS-2**	• **Gravitation and Central Force Motion** ○ **Law of gravitation.** ○ **Gravitational potential energy.** ○ **Inertial and gravitational mass.** ○ **Potential and field due to spherical shell and solid sphere.**	4
	PHSSSEC02M	• **Introduction** ○ **Importance of computers in Physics, paradigm for solving physics problems for solution.** ○ **Usage of linux as an Editor.** ○ **Algorithms and Flowcharts:** ○ **Algorithm: Definition, properties and development.** ○ **Flowchart: Concept of flowchart, symbols, guidelines, types.** ○ **Examples: [1] Cartesian to Spherical Polar Coordinates, [2] Roots of Quadratic Equation, [3] Sum of two matrices, [4] Sum and Product of a finite series, [5] calculation of sin(x) as a series.**	14

		○ **Algorithm for plotting (1) lissajous figures and (2) trajectory of a projectile thrown at an angle with the horizontal.**	
	Minor-2	• **Vector Analysis** ○ **Review of Vector algebra (scalar and vector products)** ○ **Gradient, divergence, Curl and their significances** ○ **Vector integration** ○ **Line, surface and volume integrals of vector fields** ○ **Gauss-divergence theorem and Stokes theorem (statements only)**	**10**
June 2024	**DS-2**	• **Gravitation and Central Force Motion (continued)** ○ **Motion of a particle under a central force field.** ○ **Two-body problem and its reduction to one-body problem and its solution.** ○ **The energy equation and energy diagram.** ○ **Kepler's Laws.** ○ **Satellite in circular orbit and applications.** ○ **Geosynchronous orbits.** ○ **Weightlessness.** ○ **Basic idea of global positioning system (GPS).**	**5**
	PHSSSEC02M	• **Scientific Programming** ○ **Some fundamental Linux Commands (Internal and External commands).** ○ **Development of FORTRAN/ C++** ○ **Basic elements of FORTRAN 90/95 or C++: Character Set, Constants and their types, Variables and their types, Keywords, Variable Declaration and concept of instruction and program.** ○ **Operators: Arithmetic, Relational, Logical and Assignment Operators.** ○ **Expressions: Arithmetic, Relational, Logical, Character and Assignment Expressions.** ○ **Fortran Statements: I/O Statements (unformatted/formatted), Executable and Non-Executable Statements, Layout of Fortran 90/95 or C++ Program** ○ **Format of writing Program and concept of coding, Initialization and Replacement Logic.** ○ **Examples from physics problems.**	**16**
	Minor-2	• **Electrostatics** ○ **Electrostatic Field, electric flux, Gauss's theorem of electrostatics.** ○ **Applications of Gauss theorem- Electric field due to point charge, infinite line of charge, uniformly charged spherical shell and solid sphere, plane charged sheet, charged conductor.** ○ **Electric potential as line integral of electric field.** ○ **Electric potential due to an electric dipole.** ○ **Calculation of electric field from potential.** ○ **Capacitance of an isolated spherical conductor.**	**10**

		o **Parallel plate condenser.** o **Energy per unit volume in electrostatic field.** o **Dielectric medium.**	
July 2024	**DS-2**	• **Oscillations** o **SHM: Simple Harmonic Oscillations.** o **Differential equation of SHM and its solution.** o **Kinetic energy, potential energy, total energy and their time-average values.** o **Damped oscillation.** o **Forced oscillations: Transient and steady states** o **Resonances, sharpness of resonance; power dissipation and Quality Factor**	**7**
	PHSSSEC02M	• **Control statements** o **Types of Logic (Sequential, Selection, Repetition), Branching Statements, Looping Statements, Jumping Statements** o **Subscripted Variables (Arrays: Types of Arrays, DIMENSION Statement, Reading and Writing Arrays)** o **Functions and Subroutines (Arithmetic Statement Function, Function Subprogram and Subroutine),** o **RETURN, CALL, COMMON and EQUIVALENCE Statements** o **Structure, Disk I/O Statements, open a file, writing in a file, reading from a file.** o **Examples from physics problems.**	**16**
	Minor-2	• **Electrostatics (continued)** o **Polarisation** o **Displacement vector.** o **Gauss's theorem in dielectrics.** o **Parallel plate capacitor completely filled with dielectric.** • **Linear Network** o **Impedance of L, C, R and their combinations.** o **Thevenin & Norton's Theorem.** o **Maximum power transfer theorem and superposition theorem.** o **Anderson's bridge.**	**11**
August 2024 06.08.2024	**DS-2**	**Internal Examination &** **Class for Slow Learners**	**2**
	PHSSSEC02M	**Internal Examination &** **Class for Slow Learners**	**4**
	Minor-2	**Internal Examination &** **Class for Slow Learners**	**2**
20.08.2024		**END SEMESTER EXAMINATION**	
Total classes			**101**

Name of Teacher: Ms. Anamika Das

Paper Allotted: DS-2, Mechanics I (Theory)
(Minor -2) Electricity and Magnetism-Lab

Month	Paper	Topic	No. Of classes
May 2024 04.05.2024	DS-2 Mechanics I	Elasticity: Relation between elastic constants, Twisting torque on a cylinder or wire.	4
	Semester 2 (Minor -2) Electricity and Magnetism Lab	1. To determine an unknown Low Resistance using Carey Foster's Bridge. 2. To verify the Thevenin and Norton theorems. 3. To verify the Superposition and Maximum Power Transfer theorems. [After being demonstrated the Experiments are done by the student groups]	8
June 2024	DS-2 Mechanics I	Elasticity: Bending of a beam – internal bending moment. Fluid motion: kinematics of moving Fluids: Equation of continuity.	4
	Semester 2 (Minor -2) Electricity and Magnetism Lab	4. To determine self-inductance of a coil by Anderson's bridge. 5. To study response curve of a Series LCR circuit and determine its (a) Resonant frequency, (b) Impedance at resonance, (c) Quality factor Q, and (d) Band width. [After being demonstrated the Experiments are done by the student groups]	8
July 2024	DS-2 Mechanics I	Elasticity: Idea of streamline and turbulent flow, Reynold's number. Poiseuille's Equation for Flow of a viscous Liquid through a Capillary Tube.	4
	(Minor -2) Electricity and Magnetism Lab	6. To determine an unknown Low Resistance using Potentiometer. [After being demonstrated the Experiments are done by the student groups]	4+2
August 2024 06.08.2024		Internal Examination & Class for Slow Learners	6
20.08.2024		END SEMESTER EXAMINATION	
Total Classes			40

Name of Teacher: Md Moinul Islam

Paper Allotted: Mechanics I (DS-2), DS-2 (Lab), (Minor -2) Electricity and Magnetism Theory

Month	Paper	Topic	No of classes
May 2024 04.05.2024	(Minor -2) Electricity and Magnetism Theory	Vector Analysis: Gradient, divergence, Curl and their significance, Vector Integration, Line, surface integrals of Vector fields,	6
		1.To determine the Moment of Inertia of a regular body using another auxiliary body and a cradle suspended by a metallic	4

	DS-2 (Lab)	wire. 2. To determine g and velocity for a freely falling body using Digital Timing Technique	
June 2024	**(Minor -2) Electricity and Magnetism Theory**	**Vector Analysis:** **Volume integrals of Vector fields, Gauss-divergence theorem and Stoke's theorem of vectors (statement only).** **Electrostatics:** **Electrostatic Field, electric flux, Gauss's theorem of electrostatics.**	**6**
	DS-2 (Lab)	1. **To determine Coefficient of Viscosity of water by Capillary Flow Method (Poiseuille's method).** 2. **To determine the Young's Modulus by flexure method.**	**4**
July 2024	**(Minor -2) Electricity and Magnetism Theory**	**Electrostatics:** **Applications of Gauss theoremElectric field due to point charge, infinite line of charge, uniformly charged spherical shell and solid sphere, plane charged sheet, charged conductor. Electric potential as line integral of electric field. Electric potential due to an electric dipole. Calculation of electric field from potential. Capacitance of an isolated spherical conductor. Parallel plate condenser. Energy per unit volume in electrostatic field.**	**8**
	DS-2 (Lab)	3. **To determine the Modulus of Rigidity of a wire by a torsional pendulum.** 6. **To determine the value of g using Bar Pendulum.** 7. **To determine the value of g using Kater's Pendulum.**	**6**
August 2024	**(Minor -2) Electricity and Magnetism Theory**	**Electrostatics:** **Dielectric medium, Polarisation, Displacement vector. Gauss's theorem in dielectrics. Parallel plate capacitor completely filled with dielectric.**	**4**
06.08.2024		**Internal Examination &** **Class for Slow Learners**	**6**
20.08.2024		**END SEMESTER EXAMINATION**	
Total Classes			**44**