LESSON PLAN

SUBJECT CODE :Th.2a

NAME : BISWABANDITA BARIK

BRANCH : MATH & SCIENCE

SUBJECT : PHYSICS

NUMBER OF MODULES: 12

CLASSES REQUIRED : 60

PRE-REQUISITE: To understand the basic principles of science and technology. Physics strengthens quantitative reasoning and problem solving skills that are valuable in areas beyond physics. Students who study physics or engineering physics are prepared to work on forefront ideas in science and technology.

MODULE-I

UNITS AND DIMENSIONS: 1.1 Physical quantities - (Definition). 1.2 Definition of fundamental and derived units, systems of units (FPS, CGS, MKS And SI units). 1.3 Definition of dimension and Dimensional formulae of physical quantities. 1.4 Dimensional equations and Principle of homogeneity. 1.5 Checking the dimensional correctness of Physical relations.

Objectives:

To study about different physical quantities and about their dimensional analysis.

Lecture no	Topics to be covered	PRIMARY REFERENCE (BOOKS/NOTES)
1	PHYSICAL QUANTITY, Definition of fundamental and derived units, systems of units (FPS, CGS, MKS And SI units)	R1
2	Definition of dimension and Dimensional formulae of physical quantities	T1
3	Checking the dimensional correctness of Physical relations.	T1

MODULE-II

SCALAR AND VECTORS: 2.1 Scalar and Vector quantities (definition and concept), Representation of a Vector – examples, types of vectors. 2.2 Triangle and Parallelogram law of vector Addition (Statement only). Simple Numerical. 2.3 Resolution of Vectors – Simple Numericals on Horizontal and Vertical components. 2.4 Vector multiplication (scalar product and vector product of vectors).

Objectives:

Classification of physical quantities and discussion about the addition and multiplication of vectors.

Lecture no	Topics to be covered	PRIMARY REFERENCE (BOOKS/NOTES)
4	Scalar and Vector quantities (definition and concept), Representation of a Vector – examples, types of vectors	T1, R1
5	Triangle and Parallelogram law of vector Addition (Statement only). Simple Numerical discussion	R1
6	Resolution of Vectors – Simple Numericals on Horizontal and Vertical components. Vector multiplication (scalar product and vector product of vectors).	T1

MODULE-III

KINEMATICS: 3.1 Concepts of Rest and Motion. 3.2 Displacement, Speed, Velocity, Acceleration & FORCE (Definition, formula, dimension & SI units). 3.3 Equations of Motion under Gravity (upward and downward motion) - no derivation. 3.4 Circular motion: Angular displacement, Angula velocity and Angular acceleration (definition, formula & SI units). 3.5 Relation between –(i) Linear & Angular velocity, (ii) Linear & Angular acceleration). 3.6 Define Projectile, Examples of Projectile. 3.7 Expression for Equation of Trajectory, Time of Flight, Maximum Height and Horizontal Range for a projectile fired at an angle, Condition for maximum Horizontal Range.

Objectives:

To study about the frame of reference of a particular state of an object and different types c motion.

Lecture no	Topics to be covered	PRIMARY REFERENCE (BOOKS/NOTES)
7	Concepts of Rest and Motion. Displacement, Speed, Velocity, Acceleration & FORCE (Definition, formula, dimension & SI units)	T1, R1
8	Equation of Motion under Gravity (upward and downward motion) - no derivation.	T1
9	Circular motion: Angular displacement, Angular velocity and Angular acceleration (definition, formula & SI units).	T1
10	Relation between –(i) Linear & Angular velocity, (ii) Linear & Angular acceleration).	R1
11	Define Projectile, Examples of Projectile. **Expression for Equation of Trajectory, Time of Flight, Maximum Height.**	T1
12	Horizontal Range for a projectile fired at an angle, Condition for maximum Horizontal Range	T1, R1

MODULE-IV

WORK AND FRICTION: 4.1 Work – Definition, Formula & SI units. 4.2 Friction – Definition & Concept. 4.3 Types of friction (static, dynamic), Limiting Friction (Definition with Concept). 4.4 Laws of Limiting Friction (Only statement, No Experimental Verification). 4.5 Coefficient of Friction – Definition & Formula, Simple Numericals. 4.6 Methods to reduce friction.

Objectives:
To determine the properties of a system or its loads for which a system will be in a condition of impending motion.

Lecture no	Topics to be covered	PRIMARY REFERENCE (BOOKS/NOTES)
13	Work – Definition, Formula & SI units. Friction – Definition & Concept.	T1
14	Types of friction (static, dynamic), Limiting Friction (Definition with Concept).	T1
15	Laws of Limiting Friction (Only statement, No Experimental Verification).	T1
16	Coefficient of Friction – Definition & Formula, Simple Numericals.	R1
17	Methods to reduce friction.	T1

MODULE-V

GRAVITATION: 5.1 Newton's Laws of Gravitation – Statement and Explanation. 5.2 Universal Gravitational Constant (G)- Definition, Unit and Dimension. 5.3 Acceleration due to gravity (g)- Definition and Concept. 5.4 Definition of mass and weight. 5.5 Relation between g and G. 5.6 Variation of g with altitude and depth (No derivation – Only Explanation). 5.7 Kepler's Laws of Planetary Motion (Statement only).

Objectives: To calculate the variation in acceleration due to gravity and impact of acceleration due to gravity on an object.

Lecture no	Topics to be covered	PRIMARY REFERENCE (BOOKS/NOTES)
18	Newton's Laws of Gravitation – Statement and Explanation. Universal Gravitational Constant (G)- Definition, Unit and Dimension.	R1
19	Acceleration due to gravity (g)- Definition and Concept.	
20	Definition of mass and weight. 5.5 Relation between g and G	T1, R1
21	Variation of g with respect to altitude and depth	T1
22	Kepler's law of planetary motion	R1

MODULE-VI

OSCILLATIONS AND WAVES: 6.1 Simple Harmonic Motion (SHM) - Definition & Examples. 6.2 Expression (Formula/Equation) for displacement, velocity, acceleration of a body/ particle in SHM. 6.3. Wave motion – Definition & Concept. 6.4 Transverse and Longitudinal wave motion – Definition, Examples & Comparison. 6.5 Definition of different wave parameters (Amplitude, Wavelength, Frequency, Time Period. 6.6 Derivation of Relation between Velocity, Frequency and Wavelength of a wave 6.7 Ultrasonics – Definition, Properties & Applications.

Objectives:

To observe different natural phenomenon and calculation of force associated with periodic motion.

Lecture no	Topics to be covered	PRIMARY REFERENCE (BOOKS/NOTES)
23	Simple Harmonic Motion (SHM) - Definition & Examples. Expression (Formula/Equation) for displacement, velocity, acceleration of a body/ particle in SHM.	T1
24	Wave motion – Definition & Concept.	R1
25	Transverse and Longitudinal wave motion – Definition, Examples & Comparison	T1,R1
26	Definition of different wave parameters (Amplitude, Wavelength, Frequency, Time Period.	R1
27	Derivation of Relation between Velocity, Frequency and Wavelength of a wave.	T1
28	Ultrasonics – Definition, Properties & Applications.	R1

MODULE-VII

HEAT AND THERMODYNAMICS: 7.1 Heat and Temperature – Definition & Difference 7.2 Units of Heat (FPS, CGS, MKS & SI). 7.3 Specific Heat (concept, definition, unit, dimension and simple numerical) 7.4 Change of state (concept), Latent Heat (concept, definition, unit, dimension and simple numerical) 7.5 Thermal Expansion – Definition & Concept 7.6 Expansion of Solids (Concept) 7.7 Coefficient of linear, superficial and cubical expansions of Solids – Definition & Units. 7.8 Relation between α, β & Υ 7.9 Work and Heat - Concept & Relation. 7.10 Joule's Mechanical Equivalent of Heat (Definition, Unit) 7.11 First Law of Thermodynamics (Statement and concept only)

Objectives:

To study of energy relationship involving heat, mechanical energy and other form of energy.

Lecture no	Topics to be covered	PRIMARY REFERENCE (BOOKS/NOTES)
29	Heat and Temperature – Definition & Difference	T1 R1
30	Units of Heat (FPS, CGS, MKS & SI). Specific Heat (concept, definition, unit, dimension and simple numerical) Change of state (concept), Latent Heat (concept, definition, unit, dimension and simple numerical)	R1
31	Expansion of Solids (Concept). Coefficient of linear, superficial – Definition & Units.	R1
32	cubical expansions of Solids- definition and units and Relation between α, β & Υ	T1
33	Work and Heat - Concept & Relation.	T1,R1
34	Joule's Mechanical Equivalent of Heat (Definition, Unit)	R1
35	First Law of Thermodynamics (Statement and concept only)	T1

MODULE-VIII

OPTICS: 8.1 Reflection & Refraction – Definition. 8.2 Laws of reflection and refraction (Statement only) 8.3 Refractive index – Definition, Formula &Simple numerical. 8.4 Critical Angle and Total internal reflection – Concept, Definition & Explanation 8.5 Refraction through Prism (Ray Diagram & Formula only – NO derivation). 8.6 Fiber Optics – Definition, Properties & Applications.

Objectives:

To study about light and different phenomenon related to light.

Lecture no	Topics to be covered	PRIMARY REFERENCE (BOOKS/NOTES)
36	Reflection & Refraction – Definition. Laws of reflection and refraction (Statement only)	T1
37	Refractive index – Definition, Formula &Simple numerical. Critical Angle and Total internal reflection – Concept, Definition & Explanation	R1
38	Refraction through Prism (Ray Diagram & Formula only – NO derivation).	T1
39	Fiber Optics – Definition, Properties & Applications.	T1

MODULE-IX

ELECTROSTATICS & MAGNETOSTATICS: 9.1 Electrostatics – Definition & Concept. 9.2 Statement & Explanation of Coulombs laws, Definition of Unit charge. 9.3 Absolute & Relative Permittivity (ε) – Definition, Relation & Unit. 9.4 Electric potential and Electric Potential difference (Definition, Formula & SI Units). 9.5 Electric field, Electric field intensity (E) – Definition, Formula & Unit. 9.6 Capacitance - Definition, Formula & Unit. 9.7 Series and Parallel combination of Capacitors (No derivation, Formula for effective/Combined/total capacitance & Simple numericals). 9.8 Magnet, Properties of a magnet. 9.9 Coulomb's Laws in Magnetism – Statement & Explanation, Unit Pole (Definition). 9.10 Magnetic field, Magnetic Field intensity (H) - (Definition, Formula & SI Unit). 9.11 Magnetic lines of force (Definition and Properties) 9.12 Magnetic Flux (Φ) & Magnetic Flux Density (B) – Definition, Formula & Unit.

Objectives:

To study about electric field and magnetic field and the laws related to force between two charge and two poles.

Lecture no	Topics to be covered	PRIMARY REFERENCE (BOOKS/NOTES)
40	Electrostatics – Definition & Concept. Statement & Explanation of Coulombs laws, Definition of Unit charge.	T1
41	Absolute & Relative Permittivity (ε) – Definition, Relation & Unit. Electric potential and Electric Potential difference (Definition, Formula & SI Units).	T1,R1
42	Electric field, Electric field intensity (E) – Definition, Formula & Unit. Capacitance - Definition, Formula & Unit	R1
43	Series and Parallel combination of Capacitors (No derivation, Formula for effective/Combined/total capacitance & Simple numericals).	T1
44	Magnet, Properties of a magnet. Coulomb's Laws in Magnetism – Statement & Explanation, Unit Pole (Definition).	T1,R1
45	Magnetic field, Magnetic Field intensity (H) - (Definition, Formula & SI Unit).	R1
46	Magnetic lines of force (Definition and Properties) Magnetic Flux (Φ) & Magnetic Flux Density (B) – Definition, Formula & Unit.	T1

MODULE-X

CURRENT ELECTRICITY: 10.1 Electric Current – Definition, Formula & SI Units. 10.2 Ohm's law and its applications. 10.3 Series and Parallel combination of resistors (No derivation, Formula for

effective/ Combined/ total resistance & Simple numericals). 10.4 Kirchhoff's laws (Statement & Explanation with diagram). 10.5 Application of Kirchhoff's laws to Wheatstone bridge - Balanced condition of Wheatstone's Bridge – Condition of Balance (Equation).

Objectives:

To study about the energy conversion and energy related to running the industrial equipment and home devices.

Lecture no	Topics to be covered	PRIMARY REFERENCE (BOOKS/NOTES)
47	Electric Current – Definition, Formula & SI Units.	T1
48	Ohm's law and its applications.	R1
49	Series and Parallel combination of resistors (No derivation, Formula for effective/ Combined/ total resistance.	T1,R1
50	Simple numerical discussion.	T1
51	Kirchhoff's laws (Statement & Explanation with diagram).	R1
52	Application of Kirchhoff's laws to Wheatstone bridge - Balanced condition of Wheatstone's Bridge – Condition of Balance (Equation	T1

MODULE-XI

ELECTROMAGNETISM & ELECTROMAGNETIC INDUCTION: 11.1 Electromagnetism – Definition & Concept. 11.2 Force acting on a current carrying conductor placed in a uniform magnetic field, Fleming's Left Hand Rule 11.3 Faraday's Laws of Electromagnetic Induction (Statement only) 11.4 Lenz's Law (Statement) 11.5 Fleming's Right Hand Rule 11.6 Comparison between Fleming's Right Hand Rule and Fleming's Left Hand Rule.

Objectives:

To study about conversion of mechanical or magnetic energy to the electrical energy and transfer of electrical energy from one device to another without any contact by the method of induction.

Lecture no	Topics to be covered	PRIMARY REFERENCE (BOOKS/NOTES)
53	Electromagnetism – Definition & Concept.	T1
	Force acting on a current carrying conductor placed in a uniform	R1
54	magnetic field, Fleming's Left Hand Rule	T1,R1
55	Faraday's Laws of Electromagnetic Induction (Statement only)	R1
56	Lenz's Law (Statement)	T1
57	Fleming's Right Hand Rule Comparison between Fleming's Right Hand Rule and Fleming's Left Hand Rule.	

MODULE-XII

MODERN PHYSICS: 12.1 LASER & laser beam (Concept and Definition) 12.2 Principle of LASER (Population Inversion & Optical Pumping) 12.3 Properties & Applications of LASER 12.4 Wireless Transmission – Ground Waves, Sky Waves, Space Waves (Concept & Definition)

Objectives:

To transfer the light energy to the far distance and production of light energy by the method of atomic energy level transition.

Lecture no	Topics to be covered	PRIMARY REFERENCE (BOOKS/NOTES)
58	LASER & laser beam (Concept and Definition) Principle of LASER (Population Inversion & Optical Pumping)	T1,R1
59	Properties & Applications of LASER	R1
60	Wireless Transmission – Ground Waves, Sky Waves, Space Waves (Concept & Definition)	R1

COURSE DELIVERY PLAN:

WEEK	1	2	3	4	5	6	7	8	9	10	11	12	13	14
	4	4	4	4	4	4	4	4	4	4	4	4	4	4
MODULE	1 & 2	2 & 3	3	4	4 & 5	5 & 6	6	7	7 & 8	8 & 9	9	9 & 10	10	11

BOOKS FOR REFERENCE:

TEXT BOOKS
T1: H C VERMA (fundamental of physics vol 1 ,2)
    Fundamental OF PHYSICS BY S Chand publication.

REFERENCE
R1: engg. physics by kp publication.

	Prepared by	Approved by
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