



**DEPARTMENT OF MATHEMATICS AND SCIENCE
ORISSA SCHOOL OF MINING ENGINEERING,
KEONJHAR**

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	Discipline: Electrical, Metallurgy and Mining	Yearly Pattern	Name of the Teaching Faculty: Prajna Priyadarshinee Rout , Lecturer (Stage-II) in Physics	
	Subject: APPLIED PHYSICS (Th-2)	No. of days/per week class allotted:04	Session From date: 17.08.2026 ToDate: 17.04.2027 No.of Weeks:35	
Month	PRE- REQUISITE	Basic knowledge about concept and application of Physics		
	COURSE OUTCOMES	CO1: Apply the concepts of physical quantities, units, dimensions, measurement techniques, and error analysis to solve engineering and scientific problems accurately. CO2: Analyze the principles of mechanics including force, friction, work, power, energy, circular motion, rotational motion, and conservation laws in practical engineering applications. CO3: Explain and evaluate the properties of matter, elasticity, fluid mechanics, wave motion, oscillations, sound, and thermal phenomena relevant to engineering systems. CO4: Apply the laws of geometrical optics and optical instruments to analyze image formation, optical fibers, and related technological applications. CO5: Analyze electrostatic and electrical circuits using concepts of electric fields, capacitors, current electricity, electromagnetic induction, magnetic effects of current, and electrical measuring instruments. CO6: Explain the principles of semiconductor devices, p-n junctions, rectifiers, lasers, and modern physics concepts, and relate them to engineering and technological applications.		
	Week	Class Day	Theory/Practical Topics	DELIVERY METHOD
August	1 ST	1 ST	Unit 1: Physical world, Units and Measurements 1.1 Physical quantities: fundamental and derived,	Whiteboard
		2 ND	Units and systems of units (FPS, CGS and SI units),	Whiteboard
		3 RD	1.2 Dimensions and dimensional formulae of physical quantities such as velocity, acceleration, force, linear momentum, kinetic energy, potential energy, work, power, pressure and density,	Whiteboard
		4 TH	Principle of homogeneity of dimensions, Dimensional equations and their applications (conversion from one system of units to other	Whiteboard
	2 ND	1 ST	checking of dimensional equations and derivation of simple	Whiteboard

			equations), Limitations of dimensional analysis.	
		2 ND	1.3 Errors in measurements (systematic and random), absolute error, relative error	
		3 RD	Error propagation, error estimation	Whiteboard
		4 TH	Significant figures.	Whiteboard
	3 RD	1 ST	Doubt clearing and problem solving	Whiteboard
		2 ND	Quiz Test-1	Google form
		3 RD	Revision	Whiteboard
		4 TH	Unit 2: Force and Friction 2.1 Scalar and Vector quantities – examples, representation of vector	Whiteboard
	4 TH	1 ST	types of vectors. Addition and Subtraction of Vectors, Triangle and Parallelogram law (Statement only),	Whiteboard
		2 ND	Scalar and Vector Product	Whiteboard
		3 RD	Resolution of a Vector	Whiteboard
		4 TH	2.2 Newton's Laws of Motion, Force, Momentum,	Google form
	5 TH	1 ST	Statement and derivation of conservation of linear momentum, its applications such as recoil of gun,	PPT
		2 ND	rockets, Impulse and its applications	Whiteboard
		3 RD	2.3 Friction: concept, types of Friction, laws of limiting friction,	Whiteboard
		4 th	coefficient of friction, Angle of Friction, Angle of Repose, Methods of reducing friction and its engineering applications	Whiteboard & PPT
	6 TH	1 st	Revision, Doubt clearing and problem solving	Whiteboard
		2 nd	Class Test -1	Whiteboard
		3 rd	Unit 3: Work, Power, Energy 3.1 Work: Concept and units, examples of zero work, positive work and negative work Energy and its units,	
		4 TH	Kinetic energy, Work-Energy Theorem (Concepts only),	Whiteboard
	7 TH	1 ST	Gravitational potential energy with examples and derivations	Whiteboard
		2 ND	Mechanical energy, conservation of mechanical energy for freely falling bodies.	Whiteboard
		3 RD	3.2 Power and its units, power and work relationship, calculation of power (numerical problems).	Whiteboard
		4 TH	Workbook Question Discussion	Whiteboard
	8 TH	1 ST	Quiz test-2	Google form
		2 ND	Assignment-1 (Unit-1 & 2 & 3)	PPT
		3 RD	Revision (Unit-3)	Whiteboard

October

October	9 TH	4 TH	Unit 4: Circular & Rotational Motion 4.1 Circular motion, definition of angular displacement, angular velocity, angular acceleration, frequency, time period	Whiteboard
		1 ST	Relation between linear and angular velocity, linear acceleration and angular acceleration (related numerical),	Whiteboard
		2 ND	Centripetal and Centrifugal forces with live examples, Expression and applications such as banking of roads(without Friction) and bending of cyclist.	Whiteboard
		3 RD	4.2 Translational and rotational motions with examples, Definition of torque and angular momentum and their examples,	Whiteboard
		4 TH	Conservation of angular momentum (quantitative) and its applications.	Whiteboard, PPT
	10 TH	1 ST	4.3 Moment of inertia and its physical significance, radius of gyration for rigid body,	Whiteboard
		2 ND	Theorems of parallel and perpendicular axes (statements only),	Whiteboard, PPT
		3 RD	Moment of inertia of rod, disc, ring and sphere (hollow and solid); (Formulae only).	Whiteboard
		4 TH	Doubt clearing class, Numericals solving	Whiteboard
	11 TH	1 ST	workbook questions discussion	Whiteboard
		2 ND	Class Test-2	Google form
		3 RD	Unit 5: Properties of Matter 5.1 Elasticity: definition of stress and strain, moduli of elasticity,	Lecture notes
		4 TH	Hooke's law, significance of stress-strain curve.	Whiteboard
November	12 TH	1 ST	5.2 Pressure: definition, units, atmospheric pressure, gauge pressure, absolute pressure	Whiteboard
		2 ND	5.3 Surface tension: concept, units, cohesive and adhesive forces	Whiteboard
		3 RD	angle of contact, applications of surface tension.	Whiteboard
		4 TH	5.4 Viscosity and coefficient of viscosity: Terminal velocity, Stoke's law	Whiteboard
	13 TH	1 ST	Effect of temperature on viscosity, application in hydraulic systems.	Whiteboard
		2 ND	5.5 Hydrodynamics: Fluid motion, streamline and turbulent flow, Reynold's number	Whiteboard
		3 rd	Equation of continuity, Bernoulli's Theorem (only formula and numerical) and its applications.	PPT
		4 TH	Doubt clearing class, Numericals solving	Whiteboard
	14 TH		workbook questions discussion	Whiteboard
		1 ST		
		2 ND	Revision	Whiteboard
		3 RD	Quiz test-3	Google form

November

	15 TH	4 TH	Unit-6: Waves and Oscillations 6.1 Periodic Motion, Oscillatory Motion, Simple Harmonic Motion (SHM): definition, expression for displacement	Whiteboard
		1 st	Expression for velocity, acceleration, time period, frequency	Whiteboard
		2 nd	Total Energy of a particle executing SHM	Whiteboard
		3 rd	Free, forced and resonant vibrations with examples.	Whiteboard
		4 th	6.2 Wave motion, transverse and longitudinal waves with examples,	Whiteboard
	16 TH	1 st	Definitions of wave velocity, frequency and wave length and their relationship	Whiteboard
		2 nd	wave equation, amplitude, phase, phase difference, principle of superposition of waves.	Whiteboard
		3 rd	6.3 Characteristics of Sound Wave (Intensity, Loudness, Pitch & Quality),	Whiteboard
		4 th	Reverberation, reverberation time, echo (Concepts only)	Whiteboard
	17 th	1 st	Ultrasonic waves–Introduction and properties, engineering and medical applications of ultrasonic	Whiteboard
		2 nd	Doubt clearing class, Numericals solving	Whiteboard
		3 rd	workbook questions discussion	Whiteboard
		4 th	Class Test-3	
	18 th	1 st	Unit 7: Thermal Physics 7.1 Concept of heat and temperature, specific heats	Whiteboard
		2 nd	Thermal Capacity, Latent Heat, Principle of Heat with numerical	Whiteboard
		3 rd	scales of temperature and their relationships	Whiteboard
		4 th	7.2 Expansion of solids, coefficient of linear, superficial expansion	Whiteboard
	19 th	1 st	cubical expansions of solids and relation among them.	Whiteboard
		2 nd	7.3 Modes of heat transfer (conduction, convection and radiation with examples),	Whiteboard
		3 rd	Co-efficient of thermal conductivity, engineering applications.	Whiteboard
		4 th	Doubt clearing class, Numericals solving	Whiteboard
	20 th	1 st	workbook questions discussion	Whiteboard
		2 nd	Important questions Practice	
		3 rd	Revision	
		4 th	Assignment-2 (Unit-4, 5, 6 & 7)	

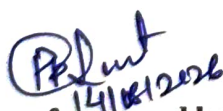
January	21st	1st	Unit-8: Optics 8.1 Laws of reflection, Laws of refraction, refractive index,	PPT
		2nd	Image formation by spherical mirrors, Mirror Formula with numerical,	PPT
		3rd	Image formation by Lens, Lens formula with numerical,	PPT
		4th	Power of lens, magnification of Lens.	PPT
	22nd	1st	8.2 Critical angle, Total internal reflection, applications of total internal reflection,	PPT
		2nd	Optical fiber applications in: telecommunication, medical and sensors.	PPT
		3rd	8.3 Optical Instrument: Simple Microscope and its magnifying Power	PPT
		4th	Doubt clearing class, Numericals solving	
	23rd	1st	workbook questions discussion	
		2nd	Class Test-4	
		3rd	Class test Copy checking	
		4th	UNIT-9: Electrostatics 9.1 Coulomb's law, unit of charge, Electric field	Whiteboard
	24th	1st	Electric lines of force and their properties, Electric flux	Whiteboard
		2nd	Electric potential and potential difference, Gauss law:	Whiteboard
		3rd	Application of Gauss law to find electric field intensity of straight charged conductor,	Whiteboard
		4th	Electric field due to plane charged sheet.	Whiteboard
February	25th	1st	9.2 Capacitance and its units. Capacitance of a Spherical conductor,	Whiteboard
		2nd	Parallel plate capacitor & dielectric and its effect on capacitance	Whiteboard
		3rd	Series and parallel combination of capacitors (related numerical)	Whiteboard
		4th	Doubt clearing class, Numericals solving	Whiteboard
	26th	1st	workbook questions discussion	
		2nd	Quiz test-5	Google form
		3rd	Unit-10: Current Electricity 10.1 Electric Current and its units, Drift Velocity and expression of Current in terms of drift Velocity,	Whiteboard
		4th	Direct and alternating current, Resistance and its units,	Whiteboard
	27th	1st	Specific resistance, Conductance, Specific conductance	Whiteboard

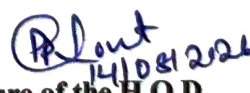
		2nd	Series and parallel combination of resistances. Effect of Temperature on Resistance.	Whiteboard
		3rd	10.2 Ohm's law and its verification, Concept of terminal potential difference,	Whiteboard
		4th	Electromotive force (EMF) & Internal Resistance of Cell., Kirchhoff's laws,	Whiteboard
	28 th	1st	Wheatstone bridge (Balanced Condition)	Whiteboard
		2nd	Doubt clearing class, Numericals solving	Whiteboard
		3rd	workbook questions discussion	
		4th	Revision	
	29 th	1st	Unit-11: Magnetic Effect of Current & Electromagnetism 11.1 Coulomb's Law in Magnetism, Magnetic field and its units	Whiteboard
		2nd	Magnetic intensity, magnetic lines of force and its properties,	Whiteboard
		3rd	magnetic flux and units, Intensity of magnetization	Whiteboard
		4th	Types of magnetic materials: dia, para and ferromagnetic with their properties,	Whiteboard
	30 th	1st	11.2 Biota-Savart's Law	Whiteboard
		2nd	Magnetic Field due to Infinite straight conductor	Whiteboard
		3rd	Magnetic field Centre of a circular coil carrying current (Formula Only),	Whiteboard
		4th	Force on moving charge in magnetic field	Whiteboard
	31 st	1st	Force on current carrying conductor placed in a magnetic Field	Whiteboard
		2nd	Concept of electromagnetic induction,	Whiteboard
		3rd	Faraday's Laws of Electromagnetic Induction	Whiteboard
		4th	11.3 Moving coil galvanometer (principle only), Conversion of a galvanometer into ammeter and voltmeter.	PPT
	32 nd	1st	Doubt clearing class, Numericals solving	
		2nd	Workbook questions discussion Assignment-3(Unit-8,9,10,11)	
		3 rd	Unit-12: Semiconductor & Modern Physics 12.1 Energy bands in solids- Distinguish between conductor, semi-conductor & insulator on the basis of Band Theory,	Whiteboard
		4 th	Intrinsic and extrinsic semiconductors,	Whiteboard

April	33 rd	1st	Effect of Temperature on resistivity of a Semiconductor (Concept only), p-n junction,	Whiteboard
		2nd	Junction diode and V-I characteristics,	Whiteboard
		3rd	Diode as rectifier – half wave rectifier	Whiteboard
		4th	Full wave rectifier (centre taped).	Whiteboard
	34 th	1st	12.2 LASER and its Properties, spontaneous and stimulated emission	Whiteboard
		2nd	population inversion, optical pumping.	Whiteboard
		3rd	Engineering and medical applications of lasers	Whiteboard
		4th	Doubt clearing class	Whiteboard
	35 th	1st	Workbook questions discussion	
		2nd	Practice for exam	
		3rd	Revision	
		4th	Revision	

LEARNING RESOURCES:

1. Applied Physics-I (English) by Prof. Vinod Kumar Yadav (down load from <https://ekumbh.aicte-india.org/dbook.php>)
2. 'Text Book of Physics for Class XI& XII (Part-I, Part-II); N.C.E.R.T., Delhi
3. Applied Physics, Vol. I and Vol. II, TTTI Publications, Tata McGraw Hill, Delhi.
4. Concepts in Physics by HC Verma, Vol. I & II, Bharti Bhawan Ltd. New Delhi
5. Engineering Physics by PV Naik, Pearson Education Pvt. Ltd, New Delhi
6. Engineering Physics by DK Bhattacharya & Poonam Tandan; Oxford University Press, New Delhi.
7. Comprehensive Practical Physics, Vol, I & II, JN Jaiswal, Laxmi Publications (P) Ltd., New Delhi
8. Practical Physics by C. L. Arora, S. Chand Publication.
9. e-books/e-tools/ learning physics software/websites etc.


 Signature of concerned lecturer
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