



ସରକାରୀ ବହୁବୃତ୍ତି ଶିକ୍ଷାନୁଷ୍ଠାନ କନ୍ଦମାଳ, ଫୁଲବାଣୀ

GOVERNMENT POLYTECHNIC – KANDHAMAL, PHULBANI

Lesson Plan

Discipline: Civil, Electrical, & Mechanical Engg.		Name of Faculty : Dr. Abhaya Prasada Mohapatra
Subject: Applied Physics (TH 2)	No. of days per week Class allotted: 4 Total period: 128	From Date: 17-08-2026 To date : 17-04-2027
Week	Class Day	Theory
1st	1st	Introduction to the Subject, Syllabus and Course Outcomes
	2nd	Unit 1: Physical world, Units and Measurements Physical quantities; fundamental and derived, Units and systems of units (FPS, CGS and SI units)
	3rd	Dimensions and dimensional formulae of physical quantities Principle of homogeneity of dimensions
	4th	Dimensional equations and their applications - conversion from one system of units to other
2nd	1st	Checking of dimensional correctness of equations
	2nd	Derivation of simple equations, Limitations of dimensional analysis.
	3rd	Measurements: Need, measuring instruments, least count, types of measurement (direct, indirect)
	4th	error propagation, error estimation
3rd	1st	Significant figures
	2nd	Problem solving class
	3rd	Unit 2: Force and Friction Scalar and Vector quantities – examples, representation of vector, types of vectors.
	4th	types of vectors (Continue), Addition and Subtraction of Vectors, Triangle and Parallelogram law (Statement only)
4th	1st	Scalar and Vector Product
	2nd	Resolution of a Vector and its application to inclined plane and lawn roller.
	3rd	Force, Momentum, Statement and derivation of conservation of linear momentum,
	4th	Its applications such as recoil of gun, rockets, Impulse and its applications.
5th	1st	Circular motion, definition of angular displacement, angular velocity, angular acceleration, frequency, time period
	2nd	Relation between linear and angular velocity, linear acceleration and angular acceleration (related numerical)
	3rd	Centripetal and Centrifugal forces with live examples, Expression and applications such as banking of roads and bending of cyclist.
	4th	Doubt Clear Class

Week	Class Day	Theory
6th	1st	Unit 3: Work, Power and Energy Work: Concept and units, examples of zero work, positive work and negative work
	2nd	Friction: concept, types
	3rd	Laws of limiting friction, coefficient of friction
	4th	Reducing friction and its engineering applications,
7th	1st	Work done in moving an object on horizontal and inclined plane for rough and plane surfaces and related applications.
	2nd	Energy and its units, kinetic energy, gravitational potential energy with examples Derivation of gravitational potential energy
	3rd	Mechanical energy, conservation of mechanical energy for freely falling bodies, trans- formation of energy (examples).
	4th	Transformation of energy with examples
8th	1st	Power and its units, power and work relationship, calculation of power (numerical problems).
	2nd	Doubt Clear Class
	3rd	Unit 4: Circular and Rotational Motion Circular motion, angular displacement, angular velocity
	4th	Angular acceleration, frequency, time period
9th	1st	Relation between linear and angular velocity, linear and angular acceleration
	2nd	Moment of inertia and its physical significance
	3rd	Numerical solved
	4th	Centripetal and centrifugal force with live examples
10th	1st	Expression and applications such as banking of roads and bending of cyclist
	2nd	Translational and rotational motions with examples
	3rd	Definition of torque and angular momentum and their examples Conservation of angular momentum (quantitative) and its applications
	4th	Moment of inertia and its physical significance, Radius of gyration for rigid body
11th	1st	Theorem of parallel and perpendicular axes (statements only)
	2nd	Moment of inertia of rod, disc, ring and sphere (hollow and solid) (Formulae only).
	3rd	Unit 5: Properties of Matter Elasticity: definition of stress and strain
	4th	Moduli of elasticity, Hooke's law, significance of stress-strain curve.
12th	1st	Pressure: definition, units, atmospheric pressure, gauge pressure, absolute pressure
	2nd	Fortin's Barometer and its applications.
	3rd	Surface tension: concept, units, cohesive and adhesive forces, angle of contact, Ascent Formula (No derivation)
	4th	Viscosity and coefficient of viscosity:
13th	1st	Terminal velocity, Stoke's law and effect of temperature on viscosity, application in hydraulic system
	2nd	Hydrodynamics: Fluid motion, stream line and turbulent flow
	3rd	Reynold's number Equation of continuity
	4th	Bernoulli's Theorem (only formula and numericals) and its applications.

Week	Class Day	Theory
14th	1st	Unit 6: Waves and Oscillation Periodic motion, Oscillatory motion
	2nd	Simple Harmonic Motion (SHM): definition, expression for displacement, velocity, acceleration, time period, frequency
	3rd	Total energy of a particle executing SHM
	4th	Free, forced and resonant vibrations with examples
15th	1st	Wave motion, transverse and longitudinal waves with examples
	2nd	Defination of wave velocity, frequency and wavelength and their relationship
	3rd	Wave equation, amplitude, phase, phase difference, principle of superposition of wave
	4th	Chracteristic of sound wave (Intensity, Loudness, Pitch and Quality), Reverberation, reverberation time
16th	1st	Echo, noise, coefficient of absorption of sound, methods to control reverberation time and their applications
	2nd	Ultrasonic waves – Introduction and properties, engineering and medical applications of ultrasonic.
	3rd	Problem solving
	4th	UNIT 7: Thermal Physics Concept of heat and temperature, Specific heats, Thermal capacity
17th	1st	Principal of heat with numerical scales of temperature and their relationships
	2nd	Expansion of solids, coefficient of linear expansion of solids
	3rd	Coefficient of superficial and cubical expansion of solids
	4th	Relation between coefficient of linear expansion, superficial expansion of solid
18th	1st	Relation between coefficient of linear expansion and cubical expansion of solid
	2nd	Modes of heat transfer with examples, conduction and convection process
	3rd	Radiation process with example, Thermal conductivity, factors affecting thermal conductivity
	4th	Co-efficient of thermal conductivity and it's engineering applications
19th	1st	Problem solving class
	2nd	UNIT 8: Optics Basic optical laws; Reflection and Refraction
	3rd	Refractive index, and image formation by mirrors
	4th	Images and image formation by lens and thin lenses
20th	1st	Lens formula, power of lens
	2nd	Magnification and defects
	3rd	Total internal reflection, Critical angle and conditions for total internal reflection, applications of total internal reflection in optical fiber
	4th	Applications of total internal reflection in optical fiber
21st	1st	Optical fiber application in telecommunication, medical and sensor
	2nd	Optical Instruments; simple microscope, magnifying power
	3rd	Problem solving
	4th	UNIT 9: Electrostatics Coulombs law, unit of charge, Electric field, Electric lines of force and their properties
22nd	1st	Electric flux, Electric potential and potential difference
	2nd	Gauss law: Application of Gauss law to find electric field intensity of straight charged conductor
	3rd	Plane charged sheet and charged sphere.
	4th	Capacitor and its working, Types of capacitors, Capacitance and its units.

Week	Class Day	Theory
23rd	1st	Effective capacitance of series and parallel connected circuit
	2nd	Capacitance of a spherical conductor, parallel plate capacitor
	3rd	Dielectric and its effect on capacitance
	4th	Problem solving class
24th	1st	Unit 10: Current electricity Electric current and its units, Drift velocity
	2nd	Expression of current in terms of drift velocity, DC and AC current
	3rd	Resistance and its units, specific resistance, conductance, specific conductance
	4th	Series and parallel combination of resistance, effect of temperature on resistance
25th	1st	Ohm's law and its verification, Kirchhoff's laws
	2nd	Wheatstone bridge and its applications (slide wire bridge only)
	3rd	Concept of terminal potential difference and Electromotive force (EMF)
	4th	Heating effect of current, Electric power, Electric energy and its units (related numerical problems)
26th	1st	Advantages of Electric Energy over other forms of energy
	2nd	Numericals
	3rd	UNIT 11: Magnetic effect of current and Electromagnetism Coulombs's law of Magnetism, magnetic field and its units
	4th	Types of magnetic materials; dia, para and ferromagnetic with their properties
27th	1st	Magnetic field and its units, magnetic intensity, magnetic lines of force and its properties
	2nd	Magnetic flux and units, magnetization
	3rd	Concept of electromagnetic induction, Faraday's Laws
	4th	Biota-Savart's law, Magnetic field due to infinite straight conductor and at the centre of a circular current carrying wire
28th	1st	Lorentz force (force on moving charge in magnetic field). Force on current carrying conductor placed on a magnetic field
	2nd	Concept of electromagnetic induction, Faraday's laws of electromagnetic induction
	3rd	Lenz's law with example
	4th	Moving coil galvanometer; principle, construction and working
29th	1st	Conversion of a galvanometer into ammeter and voltmeter.
	2nd	UNIT 12: Semiconductor and Modern Physics Energy bands in solids, Types of materials (insulator, semi-conductor, conductor)
	3rd	Intrinsic and extrinsic semiconductors, p-n junction
	4th	Junction Diode and V-I characteristics, types of junction diodes
30th	1st	Diode as rectifier – half wave and full wave rectifier (center taped).
	2nd	Lasers: Energy levels, ionization and excitation potentials
	3rd	Spontaneous and stimulated emission
	4th	Population inversion, pumping methods
31st	1st	Optical feedback and types of laser
	2nd	Laser characteristics, engineering and medical applications of lasers
	3rd	Engineering and medical applications of lasers
	4th	Numericals
32nd	1st	Revision
	2nd	Revision
	3rd	Revision
	4th	Revision

BOOK REFERENCE:

1. Applied Physics-I and II (English) by Prof. Vinod Kumar Yadav
2. Text Book of Physics for Class XI & XII(Part-I, Part-II); N.C.E.R.T., Delhi
3. Concepts in Physics by HC Verma, Vol. I & II, Bharti Bhawan Ltd. New Delhi

Abhaya Prasada Mohapatra

Concerned faculty:

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30/07/2026