

GOVT. POLYTECHNIC GAJAPATI

Discipline:
CIVIL &
MECHANICAL

Yearly
Pattern

Name of the Teaching Faculty: KUSUM BEHERA, GUEST
FACULTY (Physics)

Subject: APPLIED
PHYSICS (Th-2)

No. of
days/per
week class
allotted:04

Session From date: **17.08.2026** To Date: **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

1ST

1ST

Unit 1: Physical world, Units and Measurements

Whiteboard

Physical quantities: fundamental and derived, Units and systems of units (FPS, CGS and SI units)

2ND

Dimensions and dimensional formulae of physical quantities such as velocity, acceleration, force, linear momentum, kinetic energy, potential energy, work, power, pressure and density

Whiteboard

3RD

Principle of homogeneity of dimensions, Dimensional equations and their applications

Whiteboard

4TH

Conversion from one system of units to other

Whiteboard

2ND

1ST

Checking of dimensional equations and derivation of simple equations

Whiteboard

2ND

Limitations of dimensional analysis Errors in measurements (systematic and random), absolute error, relative error

ber	3 RD	3 RD	Error Propagation, Error Estimation	Whiteboard
		4 TH	Significant figures.	Whiteboard
	3 RD	1 ST	Quiz Test-1	Whiteboard
		2 ND	Revision	Google form
		3 RD	Unit 2: Force and Friction Scalar and Vector quantities – examples, representation of vector, types of vectors	Whiteboard
		4 TH	Addition and Subtraction of Vectors, Triangle and Parallelogram law (Statement only)	Whiteboard
	4 TH	1 ST	Scalar and Vector Product	Whiteboard
		2 ND	Resolution of a Vector	Whiteboard
		3 RD	Newton's Laws of Motion, Force, Momentum	Whiteboard
		4 TH	Statement and derivation of conservation of linear momentum	Google form
	5 TH	1 ST	Statement and derivation of conservation of linear momentum	PPT
		2 ND	Momentum applications such as recoil of gun, rockets, Impulse and its applications	Whiteboard
		3 RD	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	Quiz test-2	Whiteboard
		2 nd	Unit 3: Work, Power, Energy Work: Concept and units, examples of zero work, positive work and negative work Energy and its units	Whiteboard
		3 rd	Energy and its units, Kinetic energy, Work-Energy Theorem (Concepts only)	
		4 TH	Work-Energy Theorem (Concepts only), Gravitational potential energy with examples and derivations	Whiteboard
	7 TH	1 ST	Mechanical energy, conservation of mechanical energy for freely falling bodies	Whiteboard
		2 ND	Power and its units, power and work relationship	Whiteboard
		3 RD	Calculation of power (numerical problems).	Whiteboard
		4 TH	Workbook Question Discussion	Whiteboard
	8 TH	1 ST	Quiz test-3	Google form
		2 ND	Assignment-1 (Unit-1 & 2 & 3)	PPT
ber		3 RD	Revision (Unit-3)	Whiteboard
		4 TH	Unit 4: Circular & Rotational Motion Circular motion, definition of angular displacement	Whiteboard
	9 TH	1 ST	Angular velocity, angular acceleration, frequency, time period	Whiteboard

		2 ND	Relation between linear and angular velocity, linear acceleration and angular acceleration (related numerical)	Whiteboard
		3 RD	Centripetal and Centrifugal forces with live examples, Expression and applications such as banking of roads(without Friction) and bending of cyclist	Whiteboard
		4 th	Translational and rotational motions with examples, Definition of torque and angular momentum and their examples	Whiteboard, PPT
	10 TH	1 ST	Conservation of angular momentum (quantitative) and its applications	Whiteboard
		2 ND	Moment of inertia and its physical significance, radius of gyration for rigid body	Whiteboard, PPT
		3 RD	Theorems of parallel and perpendicular axes (statements only)	Whiteboard
		4 TH	Moment of inertia of rod, disc, ring and sphere (hollow and solid); (Formulae only)	Whiteboard
	11 TH	1 ST	Workbook Questions Discussion	Whiteboard
		2 ND	Quiz-4	Google form
		3 RD	Unit 5: Properties of Matter Elasticity: definition of stress and strain, Moduli of elasticity	Lecture notes
		4 TH	Hooke's law, significance of stress-strain curve.	Whiteboard
	12 TH	1 ST	Pressure: definition, units, atmospheric pressure, gauge pressure, absolute pressure	Whiteboard
		2 ND	Surface tension: concept, units, cohesive and adhesive forces	Whiteboard
		3 RD	Angle of contact, applications of surface tension.	Whiteboard
		4 TH	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	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
	15 TH	4 TH	Unit-6: Waves and Oscillations 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

December

December		3 rd	Free, forced and resonant vibrations with examples	Whiteboard
		4 th	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	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 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	Expansion of solids, coefficient of linear, superficial expansion	Whiteboard
	19 th	1 st	Cubical expansions of solids and relation among them.	Whiteboard
		2 nd	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	21 st	1 st	Unit-8: Optics Laws of reflection, Laws of refraction, refractive index	PPT
		2 nd	Image formation by spherical mirrors, Mirror Formula with numerical	PPT
		3 rd	Image formation by Lens, Lens formula with numerical,	PPT
		4 th	Power of lens, magnification of Lens	PPT
	22 nd	1 st	Critical angle, Total internal reflection, applications of total internal reflection	PPT

		2nd	Optical fiber applications in: telecommunication, medical and sensors	PPT
		3rd	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 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
	25th	1st	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 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	Ohm's law and its verification, Concept of terminal potential difference	Whiteboard
		4th	Electromotive force (EMF) & Internal Resistance of Cell., Kirchhoff's laws,	Whiteboard
	28th	1st	Wheatstone bridge (Balanced Condition)	Whiteboard
		2nd	Doubt clearing class, Numericals solving	Whiteboard
		3rd	Workbook questions discussion	
		4th	Revision	

March

March	29 th	1 st	Unit-11: Magnetic Effect of Current & Electromagnetism Coulomb's Law in Magnetism, Magnetic field and its units	Whiteboard
		2 nd	Magnetic intensity, magnetic lines of force and its properties	Whiteboard
		3 rd	Magnetic flux and units, Intensity of magnetization	Whiteboard
		4 th	Types of magnetic materials: dia, para and ferromagnetic with their properties	Whiteboard
	30 th	1 st	Biot-Savart's Law	Whiteboard
		2 nd	Magnetic Field due to Infinite straight conductor	Whiteboard
		3 rd	Magnetic field Centre of a circular coil carrying current (Formula Only)	Whiteboard
		4 th	Force on moving charge in magnetic field	Whiteboard
	31 st	1 st	Force on current carrying conductor placed in a magnetic Field	Whiteboard
		2 nd	Concept of electromagnetic induction	Whiteboard
		3 rd	Faraday's Laws of Electromagnetic Induction	Whiteboard
		4 th	Moving coil galvanometer (principle only), Conversion of a galvanometer into ammeter and voltmeter	PPT
	32 nd	1 st	Doubt clearing class, Numericals solving	
		2 nd	Workbook questions discussion Assignment-3(Unit-8,9,10,11)	
		3 rd	Unit-12: Semiconductor & Modern Physics 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	1 st	Effect of Temperature on resistivity of a Semiconductor (Concept only), p-n junction,	Whiteboard
		2 nd	Junction diode and V-I characteristics	Whiteboard
		3 rd	Diode as rectifier – half wave rectifier	Whiteboard
		4 th	Full wave rectifier (centre taped)	Whiteboard
	34 th	1 st	LASER and its Properties, spontaneous and stimulated emission	Whiteboard
		2 nd	Population inversion, optical pumping	Whiteboard
		3 rd	Engineering and medical applications of lasers	Whiteboard
		4 th	Doubt clearing class	Whiteboard
	35 th	1 st	Workbook questions discussion	
		2 nd	Practice for exam	

3rd

Revision

4th

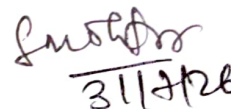
Revision

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.

Kusum Behera

Signature of concerned lecturer



Signature of the H.O.D