

UTKAL GOURAV MADHUSUDAN INSTITUTE OF TECHNOLOGY, RAYAGADA

Academic Lesson Plan for 1st year – 2026 -2027

Name of the teaching faculty: Sri Mr.Tejeswar Patra

Guest Faculty (Physics)

Discipline : Common(E&TC and Mechanical)

Dept. : Department of Mathematics & Science

Subject : Theory 2 : Applied Physics

No of Periods per week: 4

Total Periods: 128

End semester Exam.: 70 Marks,

Total Marks: 100 Marks

Date- 17/08/2026 to 17/04/2027

Week	Period	Unit / Chapter	Topics to be covered
1st	1st	Unit-1 Physical World, Units and Measurements	Introduction to physical quantities; fundamental and derived quantities; systems of units (FPS, CGS and SI) with examples.
	2nd		Dimensions and dimensional formula of physical quantities; dimensional equations and principle of homogeneity.
	3rd		Checking the correctness of formulae using dimensions; derivation of simple formulae.
	4th		Limitations of dimensional analysis; applications of dimensional analysis.
2nd	1st		Measurement; least count; accuracy and precision of measurements.
	2nd		Errors in measurement: absolute error and relative error.
	3rd		Percentage error and error propagation in measured quantities.
	4th		Error estimation in experimental measurements.
3rd	1st		Significant figures and rules for calculations.
	2nd		Numerical problems on errors, significant figures and dimensional analysis.
	3rd	Unit-2 Force and Friction	Introduction to scalars and vectors; definition, concepts and representation of vectors with examples.
4th	4th		Types of vectors; triangle law and parallelogram law of vector addition.
	1st		Resolution of vectors into horizontal and vertical components.
	2nd		Applications of vector resolution to inclined plane and lawn roller.
	3rd		Vector multiplication: scalar (dot) product.
5th	4th		Vector multiplication: vector (cross) product and applications.
	1st		Force: concept, types of force and free-body representation.
	2nd		Friction: concept and types; laws of limiting friction.
	3rd		Coefficient of friction, angle of friction and angle of repose.
6th	4th		Methods of reducing friction; friction on inclined plane and numerical problems.
	1st	Unit-3 Work, Power, Energy	Work: definition, units and conditions for zero, positive and negative work.
	2nd		Kinetic energy and potential energy; relation with work.
	3rd		Work-energy theorem and its applications.
	4th		Gravitational potential energy; derivation and applications.
7th	1st		Conservation of mechanical energy.
	2nd		Power: definition, units and numerical problems.
	3rd		Energy and power in different physical situations.
	4th		Mechanical energy and conservation in practical applications.
8th	1st		Numerical problems on work, energy and power.
	2nd		Applications and problem-solving based on work-energy and power.
	3rd	Unit-4 Circular and Rotational Motion	Circular motion: definition and angular displacement.
	4th		Angular velocity and angular acceleration.
9th	1st		Frequency, time period and relation between linear and angular motion.
	2nd		Centripetal force and its applications.
	3rd		Centrifugal force and its applications.
	4th		Centripetal and centrifugal forces in practical situations.

Week	Period	Unit / Chapter	Topics to be covered
10th	1st		Banking of roads: concept and conditions.
	2nd		Motion on banked roads without friction.
	3rd		Bending of cyclist and applications of circular motion.
	4th		Rotational motion: concept and examples.
11th	1st		Torque and angular momentum; definitions and expressions.
	2nd		Conservation of angular momentum; moment of Inertia, radius of gyration, parallel and perpendicular axis theorems.
	3rd		Elasticity: definition of stress and strain; types of stress and strain.
	4th		Moduli of elasticity: Young's, bulk and shear modulus.
12th	1st	Unit-5 Properties of Matter	Hooke's law and elastic limit.
	2nd		Stress-strain curve and significance of different regions.
	3rd		Pressure: definition, units and measurement.
	4th		Atmospheric pressure, gauge pressure and absolute pressure.
13th	1st		Surface tension: concept, units and molecular origin.
	2nd		Cohesive and adhesive forces; angle of contact.
	3rd		Applications of surface tension.
	4th		Viscosity: concept and coefficient of viscosity.
14th	1st		Stokes' law and terminal velocity.
	2nd		Applications of viscosity and numerical problems.
	3rd		Fluid motion: streamline and turbulent flow.
	4th		Reynolds number and its significance.
15th	1st		Equation of continuity.
	2nd		Bernoulli's theorem.
	3rd		Applications of Bernoulli's theorem.
	4th		Numerical problems based on fluid mechanics.
16th	1st	Unit-6 Waves and Oscillations	Oscillatory motion and Simple Harmonic Motion (SHM): definition.
	2nd		SHM: displacement, velocity and acceleration.
	3rd		Time period and frequency of SHM.
	4th		Energy in SHM and numerical problems.
17th	1st		Wave motion: transverse and longitudinal waves; wave velocity, frequency and wavelength.
	2nd		Amplitude, phase, phase difference, principle of superposition; characteristics of sound, reverberation, echo and ultrasonics with applications.
	3rd		Heat and temperature; specific heat and heat capacity.
	4th		Latent heat and principle of calorimetry.
18th	1st	Unit-7 Thermal Physics	Calorimetry: numerical problems.
	2nd		Thermal expansion of solids.
	3rd		Coefficient of linear, superficial and cubical expansion.
	4th		Relation among coefficients of expansion.
19th	1st		Modes of heat transfer: conduction.
	2nd		Convection and radiation.
	3rd		Applications of heat transfer in engineering practice.
	4th		Thermal physics numerical problems and applications.
20th	1st		Laws of reflection and refraction; refractive index.
	2nd		Image formation by spherical mirrors.
	3rd		Mirror formula with numerical problems.
	4th		Lens formula with numerical problems.
21th	1st	Unit-8 Optics	Magnification and power of lens.
	2nd		Critical angle and total internal reflection.
	3rd		Optical fibre: principle and applications.
	4th		Applications of total internal reflection in telecommunication and medical sensors.
22th	1st		Optical instrument: microscope.
	2nd		Microscope and its magnifying power; numerical problems.
	3rd		Coulomb's law of electrostatic force.
	4th		Electric field and electric field lines; properties.
23th	1st	Unit-9 Electrostatics	Electric flux and Gauss's law.
	2nd		Applications of Gauss's law to electric field intensity.
	3rd		Electric potential and potential difference.
	4th		Capacitance and its units.
24th	1st		Capacitance of a spherical conductor.
	2nd		Parallel plate capacitor and dielectric effect.
	3rd		Capacitors in series and parallel combination.
	4th		Numerical problems on electrostatics and capacitance.
25th	1st	Unit-10 Current Electricity	Electric current, drift velocity and expression for current.
	2nd		Current density and relation with drift velocity.
	3rd		Resistance, resistivity and conductivity.

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26th	1st		Ohm's law and temperature dependence of resistance.
	2nd		Series and parallel combination of resistors.
	3rd		EMF and internal resistance of a cell.
	4th		Kirchhoff's laws and applications.
27th	1st		Wheatstone bridge and balanced condition.
	2nd		Electrical energy, power and numerical problems.
	3rd		Biot-Savart law; magnetic field and magnetic lines of force.
	4th		Magnetic field due to an infinitely long straight current-carrying conductor.
28th	1st	Unit-11 Magnetic Effect of Current & Electromagnetism	Magnetic field at the centre of a circular current-carrying loop.
	2nd		Magnetic force on a moving charge in a magnetic field.
	3rd		Magnetic force on a current-carrying conductor.
	4th		Ampere's circuital law and applications.
29th	1st		Magnetic field due to solenoid/current-carrying coil.
	2nd		Electromagnetic induction: concept and Faraday's laws.
	3rd		Lenz's law and direction of induced current.
	4th		Moving coil galvanometer: principle and working.
30th	1st		Conversion of galvanometer into ammeter and voltmeter.
	2nd		Numerical problems and applications of electromagnetic induction.
	3rd		Semiconductors, conductors and insulators; distinction based on band theory.
	4th		Intrinsic and extrinsic semiconductors.
31th	1st	Unit-12 Semiconductor & Modern Physics	Concept of p-type and n-type semiconductors.
	2nd		PN junction diode and depletion region.
	3rd		Diode characteristics and V-I characteristics.
	4th		Diode as rectifier: half-wave rectifier.
32th	1st		Full-wave rectifier and centre-tapped rectifier.
	2nd		Zener diode and its characteristics.
	3rd		Applications of semiconductor devices; practical uses.
	4th		Modern/semiconductor physics applications and numerical/problem-based review.

Tejaswar
17/08/2026

Mr. Tejeswar Patra
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H.O.D
17/8/2026

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