

UTKAL GOURAV MADHUSUDAN INSTITUTE OF TECHNOLOGY, RAYAGADA

Academic Lesson Plan for 2nd Semester – 2025 (Summer)

Name of the teaching faculty: **Sri Bhabani Sankar Patnaik**

Guest Faculty (Physics)

Discipline: Common (Civil/Electrical/E&TC/Mechanical Engg.)

Dept.: Department of Mathematics & Science

Semester : 2nd Semester

Subject : Theory 2 : Applied Physics-II

No of Periods per week: 4

Total Periods: 60,

End semester Exam.: 70 Marks,

Class test: 30 Marks,

Total Marks: 100 Marks

Week	Period	Unit / Chapter	Topics to be covered
1st	1st	Unit-1 Wave motion and its applications	Wave motion, transverse and longitudinal waves with examples
	2nd		Definitions of wave velocity, frequency and wave length and their relationship,
	3rd		Sound and light waves and their properties,
	4th		Wave equation ($y = r \sin t$) amplitude, phase, phase difference, principle of superposition of waves and beat formation.
2nd	1st		Simple Harmonic Motion (SHM): definition, expression for displacement, velocity, acceleration, time period, frequency etc.
	2nd		Simple harmonic progressive wave and energy transfer, study of vibration of cantilever
	3rd		Determination of time period, Free, forced and resonant vibrations with examples.

	4th		Acoustics of buildings – reverberation, reverberation time, echo, noise, coefficient of absorption of sound.
3rd	1st		Methods to control reverberation time and their applications.
	2nd		Ultrasonic waves – Introduction and properties, engineering and medical applications of ultrasonic.
	3rd	UNIT - 2: Optics	Basic optical laws; reflection and refraction, refractive index.
	4th		Images and image formation by mirrors, lens and thin lenses.
4th	1st		Lens formula, power of lens, magnification and defects.
	2nd		Total internal reflection, Critical angle and conditions for total internal reflection, applications of total internal reflection in optical fiber.
	3rd		Optical Instruments; simple and compound microscope, astronomical telescope in normal adjustment.
	4th		Magnifying power, resolving power, uses of microscope and.
5th	1st		Telescope, optical projection systems
	2nd	UNIT - 3: Electrostatics	Coulombs law, unit of charge, Electric field, Electric lines of force and their properties.
	3rd		Electric potential and potential difference, Gauss law.
	4th		Application of Gauss law to find electric field intensity of straight charged conductor, plane charged sheet and charged sphere.
6th	1st		Capacitor and its working, Types of capacitors, Capacitance and its units.
	2nd		Capacitance of a parallel plate capacitor,

			Series and parallel combination of capacitors (related numerical).
	3rd		Dielectric and its effect on capacitance, dielectric break down.
	4th	UNIT - 4: Current Electricity	Electric Current and its units, Direct and alternating current.
7th	1st		Resistance and its units, Specific resistance, Conductance, Specific conductance, Series and parallel combination of resistances.
	2nd		Factors affecting resistance of a wire, carbon resistances and colour coding.
	3rd		Ohm's law and its verification, Kirchhoff's laws, Wheatstone bridge
	4th		Applications of Wheatstone bridge (slide wire bridge only), Concept of terminal potential difference and Electromotive force (EMF).
8th	1st		Heating effect of current, Electric power, Electric energy and its units (related numerical problems), Advantages of Electric Energy over other forms of energy.
	2nd	UNIT - 5: Electro- magnetism	Types of magnetic materials; dia, para and ferromagnetic with their properties.
	3rd		Magnetic field and its units, magnetic intensity, magnetic lines of force, magnetic flux and units, magnetization.
	4th		Concept of electromagnetic induction, Faraday's Laws, Lorentz force (force on moving charge in magnetic field)
9th	1st		Force on current carrying conductor, force on rectangular coil placed in magnetic field.

	2 nd		Moving coil galvanometer; principle, construction and working
	3 rd		Conversion of a galvanometer into ammeter and voltmeter.
	4 th	UNIT - 6: Semiconductor Physics	Energy bands in solids, Types of materials (insulator, semi-conductor, conductor), Intrinsic and extrinsic semiconductors
10th	1 st		p-n junction, junction diode and V-I characteristics, types of junction diodes. Diode as rectifier – half wave and full wave rectifier (centre taped).
	2 nd		Transistor; description and three terminals, Types- pnp and npn, some electronic applications (list only).
	3 rd		Photocells, Solar cells; working principle and engineering applications.
	4 th	UNIT - 7: Modern Physics	Lasers: Energy levels, ionization and excitation potentials.
11th	1 st		Spontaneous and Stimulated emission.
	2 nd		Population inversion, pumping methods, optical feedback
	3 rd		Types of lasers; Ruby, He-Ne
	4 th		Semiconductor laser
12th	1 st		Laser characteristics, engineering and medical applications of lasers. laser characteristics and engineering
	2 nd		Medical applications of lasers. numericals
	3 rd		Fiber Optics: Introduction to optical fibers
	4 th		Numericals on optical fibers.
13th	1 st		Light propagation, acceptance angle
	2 nd		Numerical aperture with numericals

	3rd		fiber types, applications
	4th		Application of fibers in telecommunication , medical and sensors
14th	1st		Nanoscience and Nanotechnology: Introduction
	2nd		Nanoparticles and nanomaterials.
	3rd		Application of nanoparticle and nonmaterials.
	4th		Properties at nanoscale, nanotechnology.
15TH	1st		Application of nanotechnology in everyday life with examples.
	2nd		Nanotechnology based devices and applications.
	3rd		Numerical based on nano-materials and nanotechnology
	4th		Revision

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