



# SILVER OAK UNIVERSITY

College of Technology(01)

Diploma Engineering Course(CH/CL/ME)

Subject Name: Applied Physics-II

Subject Code:1010252104

Semester: 2nd

**Prerequisite:** Zeal to learn the subject.

**Objective:** Applied Physics aims to give an understanding of this world both by observation and by prediction of the way in which objects behave. Concrete use of physical principles and analysis in various fields of engineering and technology are given prominence in the course content. The course will help the diploma engineers to apply the basic concepts and principles to solve broad-based engineering problems and to understand different technology based applications.

**Teaching and Examination Scheme:**

Teaching Scheme					Evaluation Scheme				Total Marks
L	T	P	Contact Hours	Credits	Theory		Practical		
					CIE (TH)	ESE (TH)	CIE (PR)	ESE (PR)	
3	0	2	5	4	40	60	20	30	150

**Content:**

Unit No.	Course Contents	Teaching Hours	Weightage %
1	<p><b>Wave Motion, Acoustics and Ultrasonic</b></p> <p>Wave motion, transverse and longitudinal waves with examples, definitions of wave velocity, frequency and wave length and their relationship, Sound and light waves and their properties, wave equation (<math>y = r \sin \omega t</math>) amplitude, phase, phase difference, principle of superposition of waves and beat formation.</p> <p>Acoustics of buildings – reverberation, reverberation time, echo, noise, coefficient of absorption of sound, methods to control reverberation time and their applications, Ultrasonic waves – Introduction and properties, engineering and medical applications of ultrasonic.</p>	7	20
2	<p><b>Semiconductor Physics</b></p> <p>Free electron theory, Energy bands in solids, Types of materials (insulator, semi-conductor, conductor), intrinsic and extrinsic semiconductors, Fermi level and fermi energy, p-n junction, Zener diode, junction diode and V-I characteristics, types of junction diodes. Carrier generation and recombination, Carrier transport-diffusion and drift, Diode as rectifier – half wave and full wave rectifier (center taped).</p>	7	20

3	<p><b>Electricity</b> Electric Current and its units, Direct and alternating current, Resistance and its units, Specific resistance, Conductance, Specific conductance, Electric power, Electric energy, and its units (related numerical problems).</p> <p><b>Electromagnetism</b> Types of magnetic materials; dia, para and ferromagnetic with their properties, Magnetic field and its units, magnetic intensity, magnetic lines of force, magnetic flux and units, magnetization. Concept of electromagnetic induction, Lorentz force (force on moving charge in magnetic field).</p>	10	20
4	<p><b>Optics</b> Basic optical laws; reflection and refraction, refractive index, Images and image formation by mirrors, lens, lens formula, power of lens, magnification, and defects. Optical Instruments: simple and compound microscope, astronomical telescope in normal adjustment, magnifying power, resolving power, uses of microscope and telescope, optical projection systems.</p>	8	15
5	<p><b>Modern Physics</b> Lasers: Energy levels, ionization and excitation potentials; spontaneous and stimulated emission; population inversion, pumping methods, optical feedback, Types of lasers; Ruby, He-Ne and semiconductor, laser characteristics, engineering and medical applications of lasers. Fiber Optics: Introduction to optical fibers, light propagation, acceptance angle and numerical aperture, fiber types, applications in; telecommunication, medical and sensors. Nanoscience and Nanotechnology: Introduction, nanoparticles and nanomaterials, properties at nanoscale, nanotechnology, nanotechnology-based devices and applications.</p>	10	25

**Course Outcome:**

Sr. No.	CO statement	Unit No
CO-1	The students will have the ability to understand the waves motion and its application in Acoustics.	Unit 1
CO-2	The students will be able to understand the basic on Semiconductor and its applications	Unit 2
CO-3	The students will be able to understand the basic concepts regarding electricity and magnetism.	Unit 3
CO-4	The students will be able to understand the basic optical laws, and image formation by mirrors and lenses	Unit 4
CO-5	Understanding of basic concept of laser and optical fiber.	Unit 5

### Reference Books:

1. Applied Physics, Vol. I and Vol. II, TTTI Publications, Tata McGraw Hill, Delhi.
2. Concepts in Physics by HC Verma, Vol. I & II, Bharti Bhawan Ltd. New Delhi
3. Engineering Physics by PV Naik, Pearson Education Pvt. Ltd, New Delhi
4. Practical Physics by C. L. Arora, S. Chand Publication.
5. A Textbook of Optics, N Subramanyam, Brij Lal, MN Avahanulu, S Chand and Company Ltd
6. Nanoscience and Nanotechnology, KK Choudhary, Narosa Publishing House, Pvt. Ltd. New Delhi.

### Teaching & Learning Methodology:-

Lectures with discussions, question and answer sessions, informal quizzes, video sessions where students have an opportunity to clear concepts and doubts. E – Resources for the virtual learning environment. Practical sessions for developing skills which are required in occupation.

### List of Experiments/Tutorials:

1. 1 Linear Measurement by Vernier calipers
- 2 1 Linear Measurement by Micrometer screw 3
- 3 To calculate resistance using Ohm's law
- 4 To verify law of Resistance in series and parallel 5
- 2 To find unknown resistance through whetstone bridge
- 6 To determine A.C. frequency with the help of sonometer
- 7 To determine errors in electrical measurements
- 8 To determine the divergence of He-Ne laser beam.
- 9 To Measure A.C. Power using resistive load
- 10 Measurement of Energy
- 11 To study p-n junction in forward bias
- 12 To calculate SA/V ratio of simple objects to understand nanotechnology

### Major Equipment:

Sr No	Name	Specification
1	Universal training kit – electronics	
2	Rectifier Kit (Half wave, full wave, bridge)	Consisting of 0-30 V variable power supply, Diodes (IN 4007), Module of 10k resistors, Included Filter Circuit.
3	Diode Characteristics	0-30 V regulated tunnable power supply, milliammeter (0-50mA), Microammeter (0-100 $\mu$ A), Digital multimeter, Resistances module 10K, Facility of Silicon Diode (IN4001), Germanium Diode (DR 25) and Zener Diode with reverse bias voltage Max. up to 8-9 V
4	Semiconductor energy gap set up	
5	Young's Modulus set up	Stand, weight box (up to 1kg), Samples (iron, Al, Cu etc), DC adapter, Spherometer stand with buzzer, weight holder
6	solar energy trainer	Fundamental of photovoltaic cell should be studied, application and Characteristics features should be measured by a kit
7	Ultrasonic measurement kit	
8	Fiber Optic Kit	LED source 950 nm/660 nm compatible APV or Photo diode Detector with Numerical Aperture Measurement Facility

9	Laser Source	He- Ne Laser and 1350 nm I-R Laser
10	CRO (20MHz)-(5MHz) dual channel	Dual channel,0-200 V, four probe, with power probe
11	Digital Multimeters	
12	Wires	
13	Capacitors, Resistors	
14	Diodes	
15	LEDs, LDRs	
16	Function Generator ( 5MHz)	Generation of sine, Square, Saw tooth waves required, +/- pulses frequency range up to 20 MHz, Peak to peak voltage around 20 V

**List of Open Source Software/learning website:**

- The Flying Circus of Physics 2nd edition by Jearl Walker, Wiley India
- Six Ideas that shaped physics by Thomas A Moore, McGraw Hill education
- <http://www.howstuffworks.com/> -- Tech stuff
- How things works by Louis A Bloomfeild, Wiley Publications
- Physics of Everyday Phenomena by W. Thomas Griffith, Juliet Brosing, McGraw Hill Education
- Latest journals like BBC Knowledge, How things work-everyday technology explained by National Geographics. <http://www.sciencefairadventure.com/>