



SILVER OAK UNIVERSITY

Engineering and Technology (Diploma)

All Departments

Subject Name: Applied Physics-II

Semester: 2

Prerequisite: NA

Objective:

Teaching and Examination Scheme:

Teaching Scheme			Credits	Evaluation Scheme				Total Marks
L	T	P		Internal		External		
				Th	Pr	Th	Pr	
3	0	2	4	40	50	60	--	150

Content:

Unit No.	Course Contents	Teaching Hours	Weightage %
1	<p>Wave Motion, Acoustics and Ultrasonic 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 ($y = r \sin \omega t$) amplitude, phase, phase difference, principle of superposition of waves and beat formation. 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>Semiconductor Physics Energy bands in solids, Types of materials (insulator, semi-conductor, conductor), intrinsic and extrinsic semiconductors, p-n junction, junction diode and V-I characteristics, types of junction diodes. Diode as rectifier – half wave and full wave rectifier (centre taped). Transistor; description and three terminals, Types- pnp and npn, some electronic applications (list only). Applications</p>	6	20
3	<p>Electricity Electric Current and its units, Direct and alternating current, Resistance and its units, Specific resistance,</p>	6	15

	Conductance, Specific conductance, Series and parallel combination of resistances. Factors affecting resistance of a wire, carbon resistances and colour coding. Ohm's law and its verification, Kirchhoff's laws, Concept of terminal potential difference and Electro motive force (EMF) Heating effect of current, Electric power, Electric energy and its units (related numerical problems)		
4	Electromagnetism 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, Faraday's Laws, Lorentz force (force on moving charge in magnetic field). Force on current carrying conductor, force on rectangular coil placed in magnetic field. Moving coil galvanometer; principle, construction and working, Conversion of a galvanometer into ammeter and voltmeter.	7	20
5	Modern Physics 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.	10	25

Course Outcome:

Sr. No.	CO statement	Unit No
CO-1	The students will have the ability to understand the core concept of physics and its technical applications.	
CO-2	The students will have skill of problem solving by using appropriate mathematical techniques and basic concepts.	
CO-3	In courses involving laboratory, the student will demonstrate the ability to collect and analyze data and to prepare coherent reports of his or her findings.	
CO-4	In a design module project, the student will demonstrate the ability to perform a literature search, to make use of appropriate computational or laboratory skills, and to make an effective written or oral presentation of the results of the project.	

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:-

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 Characterstics	0-30 V regulated tunnable power supply, milliammeter (0-50mA), Microammeter (0-100 μ 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,0-200V, 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/>