

**I B. Tech – I Semester**  
**(17PH101) APPLIED PHYSICS (CSE, ECE)**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	3	1	-	3

**Pre-Requisites:** None

**Course Objectives:**

Physics curriculum which is reoriented to the needs of circuital branches of graduate engineering courses is designed to:

- Impart knowledge of physical optics phenomenon like interference, diffraction and polarization involving required to design instruments with higher resolution.
- Teach concepts of coherent sources, its realization and utility optical instrumentation.
- Study the concepts regarding the bulk response of materials to the EM fields and their analytically study in the back-drop of basic quantum mechanics.
- Understand the physics of semiconductors and their working mechanism for their utility in sensors.

**UNIT-I: INTERFERENCE:** Introduction- Principle of superposition- Coherent sources- Interference in thin films by reflection- Newton rings- Principle and working of Michelson Interferometers.

**UNIT-II: DIFFRACTION:** Introduction- Fraunhofer diffraction at single slit- Diffraction at Circular aperture- Grating equation- Resolving power of Grating, Telescope and microscopes.

**POLARIZATION:** Introduction- Methods for production of polarized light- Nicol's prism- Quarter wave plate- Half wave plate- Polarimeter.

**UNIT-III: LASERS:** Introduction- Characteristics of LASER- Basic principle of LASERs- Einstein theory of LASERs- Population inversion- He-Ne Lasers

**FIBER OPTICS:** Introduction- Construction and working principle of optical fibre- Acceptance angle- Numerical aperture.

**UNIT-IV: ELECTRO MAGNETIC FIELDS:** Introduction- Scalar and Vector fields- Gauss theorem- Strokes theorem- Propagation of EM waves through dielectric medium.

**UNIT-V: QUANTUM MECHANICS:** Introduction- Debroglie hypothesis- Matter waves- Schrodinger time independent and dependent wave equations- Particle in a 1-D potential box

**FREE ELECTRON THEORY:** Classical free electron theory- Quantum free electron theory- Fermi-Dirac distribution, Fermi energy.

**UNIT-VI: BAND THEORY OF SOLIDS:** Bloch theory- Kronig- Penny model- Energy bands in solids- Classifications of solids- Effective mass of electron.

**SEMICONDUCTOR PHYSICS:** Introduction- Carrier concentration of intrinsic and extrinsic semiconductors- Drift, Diffusion currents- Hall effect.

**OUTCOME:** Construction and working principles of LASER and Optical fiber are learnt. Study of EM fields and semiconductors under the concepts of quantum mechanics paves way for their optimal utility.

**Course Outcomes:** At the end of the course, student will be able to -

CO	CO STATEMENT	BTL
CO1	Apply the basic principles and properties of Interference to construct and understanding the working mechanism of Interferometer	L2
CO2	Develop the Diffract meter by the usage of basic principles and properties of diffraction of light	L2
CO3	Construction of Polari meter and Laser by utilizing the principles of polarization of light and characteristic properties of Laser and applications of optical fibers	L2
CO4	Verify the velocity of EM wave in isotropic medium by studying its propagation through dielectric medium.	L2
CO5	Identify the conductivity of solids by applying the principles of Quantum Mechanics & free electron theory	L2
CO6	Classify the given semiconductor materials based on the band theory of solids by studying its charge carriers through the Hall effect	L2

### CO – PO MAPPING

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
1	1	1	-	-	-	-	-	-	1	-	-	-
2	1	1	-	-	-	-	-	-	-	-	-	1
3	1	1	-	-	-	-	-	-	-	-	1	-
4	1	1	-	-	-	-	-	-	1	-	-	1
5	1	1	-	-	-	-	-	-	1	-	-	-
6	1	1	-	-	-	-	-	-	-	-	1	1

### CO–PSO Mapping

	CSE			ECE	
CO	PSO1	PSO2	PSO3	PSO1	PSO2
1	-	-	-	1	-
2	-	-	-	1	-
3	-	-	-	1	-
4	1	-	-	1	-
5	1	-	-	1	-
6	-	-	-	1	-

### Text Books

1. A text book of engineering physics by Dr. M. N. Avadhanulu and Dr. P.G. KshiraSagar, S. Chand and company Ltd.
2. Solid state physics by A.J. Dekker, McMillan Publishers Engineering Physics by D.K. Battacharya and Poonam Tandon, Oxford press.

### Reference Books

1. Applied Physics by P.K. Palanisamy, Scitech Publishers.
2. Engineering Physics by Armugham, Anuradha Publication.