I Year I Semester	L	T	P	C
Code: 17PH101	3	1	0	3

APPLIED PHYSICS
(ECE and CSE)

Objectives:

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

1. Impart knowledge of physical optics phenomenon like interference, diffraction and polarization involving required to design instruments with higher resolution.
2. Teach concepts of coherent sources, its realization and utility optical instrumentation.
3. 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.
4. 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.

Text Books:

1. A text book of engineering physics by Dr. M. N. Avadhanulu and Dr. P.G. Kshira Sagar, S. Chand and company Ltd.
2. Solid state physics by A.J. Dekker, Mc Millan Publishers
3. Engneering 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