Course Code	Category	L	T	P	C	C.I.E	S.E.E.	Exam
B23BS1102	BS	3	--	--	3	30	70	3 Hrs.

ENGINEERING PHYSICS

(Common for CSE, CSIT, ECE, EEE, IT)

Course Objectives:

To bridge the gap between the Physics in school at 10+2 level and UG level engineering courses by identifying the importance of the optical phenomenon like Interference, Diffraction etc., enlightening the periodic arrangement of atoms in Crystalline Solids and concepts of Quantum mechanics, introduce novel concepts of Dielectric and Magnetic materials, Physics of Semiconductors.

Course Outcomes: At the end of the course students will be able to

S.No.	Outcome	Knowledge Level
1.	**Analyze** the intensity variation of light due to polarization, interference and diffraction.	K4
2.	**Familiarize** with the basics of crystals and their structures.	K3
3.	**Summarize** various types of polarization of dielectrics and classify the magnetic materials.	K3
4.	**Apply** the basic concepts of Quantum mechanics, free electron theory and fermi energy.	K3
5.	**Classify** the type of semiconductor using Hall effect.	K4

SYLLABUS

UNIT-I (10Hrs)

Wave Optics

Interference: Introduction - Principle of superposition - Interference of light - Interference in thin films (Reflection Geometry) & applications - Colours in thin films- Newton's Rings, Determination of wavelength and refractive index.

Diffraction: Introduction - Fresnel and Fraunhofer diffractions - Fraunhofer diffraction due to single slit, double slit (Qualitative) & N-slits (Qualitative) - Diffraction Grating - Dispersive power and resolving power of Grating (Qualitative).

Polarization: Introduction -Types of polarization - Polarization by reflection, refraction and Double refraction - Nicol's Prism - Half wave and Quarter wave plates.

UNIT-II (10 Hrs)

Crystallography and X-ray diffraction

Crystallography: Space lattice, Basis, Unit Cell and lattice parameters – Bravais Lattices – crystal systems (3D) – coordination number - packing fraction of SC, BCC & FCC - Miller indices – separation between successive (hkl) planes.

X- ray diffraction: Bragg's law - X-ray Diffractometer – crystal structure determination by Laue's and powder methods.

UNIT-III (10 Hrs)	**Dielectric and Magnetic Materials** Dielectric Materials: Introduction - Dielectric polarization - Dielectric polarizability, Susceptibility, Dielectric constant and Displacement Vector – Relation between the electric vectors - Types of polarizations- Electronic (Quantitative), Ionic (Quantitative) and Orientation polarizations (Qualitative) - Lorentz internal field - Clausius- Mosotti equation - complex dielectric constant – Frequency dependence of polarization – dielectric loss. Magnetic Materials: Introduction - Magnetic dipole moment - Magnetization-Magnetic susceptibility and permeability – Atomic origin of magnetism - Classification of magnetic materials: Dia, para, Ferro, Anti-ferro & Ferri magnetic materials - Domain concept for Ferromagnetism & Domain walls (Qualitative) - Hysteresis - soft and hard magnetic materials.
UNIT-IV (10 Hrs)	**Quantum Mechanics and Free electron Theory** Quantum Mechanics: Dual nature of matter – Heisenberg's Uncertainty Principle – Significance and properties of wave function – Schrodinger's time independent and dependent wave equations - Particle in a one-dimensional infinite potential well. Free Electron Theory: Classical free electron theory (Qualitative with discussion of merits and demerits) Quantum free electron theory – Electrical conductivity based on quantum free electron theory - Fermi-Dirac distribution - Density of states - Fermi energy.
UNIT-V (10 Hrs)	**Semiconductors** Semiconductors: Formation of energy bands – classification of crystalline solids - Intrinsic semiconductors - Density of charge carriers – Electrical conductivity – Fermi level – Extrinsic semiconductors - density of charge carriers – dependence of Fermi energy on carrier concentration and temperature - Drift and diffusion currents – Einstein's equation – Hall effect and its applications.
Textbooks:	
1.	A Textbook of Engineering Physics, M. N. Avadhanulu, P. G. Kshirsagar & T V S Arun Murthy, S. Chand Publications, 11th Edition 2019.
2.	Engineering Physics, D. K. Bhattacharya & Poonam Tandon, Oxford Press 2015
Reference Books:	
1.	Engineering Physics, B. K. Pandey & S. Chaturvedi, Cengage Learning 2021
2.	Engineering Physics, Shatendra Sharma, Jyotsna Sharma, Pearson Education 2018
3.	Engineering Physics, Sanjay D. Jain, D. Sahasrabudhe & Girish, University Press 2010
4.	Engineering Physics, M. R. Srinivasan, New Age International Publishers
e-Resources	
1.	https://www.loc.gov/rr/scitech/selected-internet/physics.html