1/4 B.Tech. FIRST SEMESTER
ENGINEERING PHYSICS
(Common to EEE, AE, ME, ECE during I B.Tech, I Semester)
(Common to CSE, IT, CE during I B.Tech, II Semester)

CourseCode(s): EE1T3, AE1T3,ME1T3, EC1T3, CS2T3, IT2T3, CE2T3 Credits: 3
Lecture: 3 periods/week Internal assessment: 30 marks
Tutorial: 1 period /week Semester end examination: 70 marks

Course Objectives:
To make student understand
- The concepts of Quantum Physics.
- The theoretical picture about a crystal structure.
- How to determine the different crystal structures by using X-diffraction techniques.
- The properties of different types of solids and to have the knowledge about the energy-band diagram in the materials.
- The advanced topics such as lasers, fibre optics and nano- materials.

Course Outcomes:
After completion of the course the student will be able to
1. Understood the basic concept of Interference
2. Utilize the phenomenon of Diffraction of light.
3. Apply the basic principles of Polarizations and its uses.
4. Understood the crystal structures and experienced how the crystal structure will be.
5. Determine the crystal structure by applying the X-ray diffraction Techniques.
6. Study the concept of Lasers and the applications.
7. Relate the basic concepts of Optical fiber and understand the communication system.
8. Relate the concept of Ultrasonic and learns how they will be used in Non-destructive Testing.

UNIT I
QUANTUM PHYSICS

Planck's black body theory of radiation - Debroglie hypothesis – Properties of matter waves –G.P. Thomson experiment– Davison and Germer experiment – Heisenberg uncertainty principle –Time independent & Time dependent Schrödinger wave equation – physical significance of wave function – Particle in one dimensional potential box.

UNIT II
CRYSTAL STRUCTURE & X-RAY DIFFRACTION:

Introduction – Space lattice – Basis - unit cell - Lattice parameters – Bravais lattices – Crystal systems – Structure and packing fraction of simple , bcc , fcc crystals. Directions and planes in crystals – miller indices –Distance between successive parallel planes- Diffraction of X rays – Bragg's law –Laue method- Powder method.

UNIT III
PHYSICS OF SOLIDS-I

Classical free electron theory-Quantum free electron theory- Fermi Dirac distribution function-Bloch theorem- Kronig penny model(qualitative treatment)- Classification of materials .

Dielectric constant – electronic, ionic and orientation polarizations–internal fields in solids – Clausius Mossotti relation –causes of dielectric breakdown.

UNIT IV

PHYSICS OF SOLIDS-II

Introduction – intrinsic semiconductor and carrier concentration- Fermi level in intrinsic semiconductor conductivity in intrinsic semiconductor– extrinsic semiconductor –carrier concentration- Fermi level in extrinsic semiconductor – Drift and diffusion current – Einstein's relations – Direct and Indirect band gap semiconductors.

Origin of magnetic moment – classification of magnetic materials – Hysteresis curve – soft and hard magnetic materials- applications.

UNIT V

ADVANCED PHYSICS

Lasers Characteristics of lasers – spontaneous and stimulated emission of radiation – population inversion – pumping – Ruby, Helium-Neon & Semiconductor lasers-Applications of lasers.

Fiber optics Principle of optical fiber – Acceptance angle and numerical aperture – Attenuation in optical fibers – applications of optical fibers.

Introduction – Surface to volume ratio- Quantum confinement effect- properties and preparation of nanomaterial – nanotubes – SWNT- MWNT- Applications of nanomaterials.

Learning Resources

Text Books:

1. Solid state Physics by S.O.Pillai. (New Age International Publications)
2. Engineering physics by M.R.Srinivasan (New Age International Publications).

Reference Books:

1. Engineering physics by D.K.Bhattacharya and A.Bhaskaran. (Oxford Publications).
2. Engineering physics by R.K Gaur and S.L. Gupta, Dhanpat Rai Publication

Web Resources:

1. http://nptel.ac.in/courses.php
2. http://jntuk-coeerd.in/