PVP SIDDHARTHA INSTITUTE OF TECHNOLOGY, KANURU, VIJAYAWADA
(Autonomous)

DEPARTMENT OF AERONAUTICAL ENGINEERING
COURSE STRUCTURE WITH EFFECT FROM 2012-13

I Year B.Tech. A.E. **T P C**
4+1* 0 4

AE2T4- ENGINEERING PHYSICS

UNIT-I: Quantum Mechanics

Introduction - Plank's black body theory of radiation - Debroglie hypothesis – Properties of matter waves – Davison and Germer experiment – G.P. Thomson experiment – Heisenberg uncertainity principle - Schrödinger wave equation – physical significance of wave function – particle in a one dimensional 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 – separation between successive (h,k,l) Parallel planes – Diffraction of X rays – Bragg's law -Laue method and Powder method.

UNIT-III: Free Electron Theory of metals

Classical free electron theory- Drift velocity – Relaxation time – Relation between relaxation time and mean collision time - Quantum free electron theory- Fermi Dirac distribution functions- causes of electrical resistance.
Bloch theorem- Kronig penny model(qualitative treatment)- Classification of materials – effective mass of an electron.

UNIT-IV: Dielectrics

Dielectric constant – Types of Dielectrics- electronic, ionic and orientation polarizations– internal fields in solids – Clausius Mossotti relation –Frequency dependence of dielectric constant and polarizability- Ferro electricity and piezoelectricity – Applications .

UNIT-V: Magnetic Properties & Superconductivity

Origin of magnetic moment – classification of magnetic materials – domain and weiss field theory – Hysteresis curve – soft and hard magnetic materials- applications.
Superconductivity – general properties – meissner effect – penetration depth – Type I & Type II superconductors – BCS theory – applications of superconductor

UNIT-VI: Semiconductors

Introduction – intrinsic semiconductor and carrier concentration- Fermi level in intrinsic semiconductor - equation for conductivity – extrinsic semiconductor - Fermi level in extrinsic semiconductor – Drift and diffusion current – Einstein's relation – continuity equation – Recombination –Direct and Indirect band gap semiconductors.
Solar radiation and conversion efficiency – p-n junction – solar cells- Hetro junction – interface and thin solar cell – applications.

UNIT-VII:-

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

Fiber optics: Principle of optical fiber – Acceptance angle and numerical aperture – types of fibers and refractive index profile – Attenuation in optical fibers – applications of optical fibers.

UNIT-VIII: **Physics of Nanomaterials**

Introduction – Surface to volume ratio- Quantum confinement effect- properties and preparation of nanomaterial – quantum wires – quantum dots – quantum wells - nanotubes – SWNT- MWNT- Fabrication of AFM, SEM, TEM, STM, MRFM, - Applications of nanomaterials.

TEXT BOOKS

1. Solid state Physics by S.O.Pillai. (New Age International Publications).
2. Physics of Semiconductors by S.M.Sze.

Reference Books

1. Engineering physics by Gaur and Gupta. (Dhenpat Rai Publications).
2. Engineering physics by D.K.Bhattacharya and A.Bhaskaran. (Oxford Publications).
3. Engineering physics by M.R.Srinivasan (New Age International Publications).