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| **ENGINEERING PHYSICS** |

**UNIT – I: CRYSTALLOGRAPHY AND X-RAY DIFFRACTION (6hours)**

Introduction – Space lattice – Basis – Unit Cell – Lattice parameters – Crystal systems – Bravais lattices – Structures and packing fractions of SC, BCC and FCC-Directions and planes in crystals – Miller indices – Separation between successive (h k l) planes – Bragg’s law- Bragg’s Spectrometer.

**UNIT – II: QUANTUM MECHANICS FOR ELECTRONIC TRANSPORT (8hours)**

**QUANTUM MECHANICS AND ELECTRON THEORY OF METALS:** Schrodinger Time Independent and Time Dependent wave equations – Particle in a box – Classical free electron theory – electrical conductivity – Mean free path – Relaxation time and drifty velocity – Quantum free electron theory – Fermi – Dirac distribution function (analytical) and its dependence on temperature – Fermi energy.

**BAND THEORY OF SOLIDS:** Bloch theorem (qualitative) – Kronig – Penney model – Origin of energy band formation in solids – Classification of materials into conductors, semi – conductors & insulators – Concepts of effective mass of electron and concept of hole.

**UNIT – III: MAGNETIC RESPONSE OF MATERIALS & SUPERCONDUCTIVITY (8hours)**

**MAGNETIC PROPERTIES :** Magnetic permeability – Magnetization – Origin of magnetic moment – Classification of Magnetic materials – Dia, Para, Ferro, Anti-Ferro and Ferri-magnetism – Hysteresis curve by Weiss Domain Theory -Soft and Hard Magnetic materials

**SUPERCONDUCTIVITY:** General properties – Meissner effect – Type I and Type II superconductors –London’s equations – Penetration depth – BCS Theory- Flux quantization –DC and AC Josephson effects-Applications of Superconductors .

**UNIT – IV: COHERENT OPTICS – COMMUNICATIONS AND STRUCTURE OF MATERIALS (9hours)**

**LASERS:** Introduction – coherent sources – Characteristics of lasers – Spontaneous and Stimulated emission of radiation – Einstein’s coefficients – three level and four level laser pumping schemes – Population inversion – Ruby laser – Helium-Neon laser- Applications of Laser.

**FIBER OPTICS:** Introduction-Principle of wave propagation in Optical Fiber-Acceptance angle and acceptance cone-Numerical aperture-Types of optical fibers - Application of optical fibers.

**UNIT – V: SEMICONDUCTOR PHYSICS (8hours)**

Introduction – Intrinsic semiconductor and carrier concentration – Equation for conductivity – Extrinsic semiconductor and carrier concentration – Drift and diffusion – Einstein’s equation – Hall Effect – direct & indirect band gap semiconductors.

**UNIT – VI: DIELECTRIC PROPERTIES& ACOUSTICS (8hours)**

**DIELECTRIC PROPERTIES:** Introduction - Dielectric constant - Electronic, ionic and orientation polarizations - Internal fields in solids - Clausius-Mossotti equation - Ferro and Piezo electricities.

**ACOUSTICS:** Sound absorption, absorption coefficient and its measurements, Reverberations time – Sabine’s formula, Eyring’s formula.

**TEXT BOOKS**

1. A Text Book of Engineering Physics by M. N. Avadhanulu & P. G. Kshirasagar (S. Chand publications)

2. Engineering Physicsby Mani Naidu S (Pearson Publications)

**REFERENCE BOOKS**

1. Introduction to solid state physics by Charles Kittle (Willey India Pvt.Ltd)

2. Applied Physics by T. Bhimasenkaram (BSP BH Publications )

3. Applied Physics by M. Arumugam (Anuradha Agencies)

4. Engineering Physics by Palanisamy (Scitech Publishers )

5. Engineering Physics by D.K.Bhattacharya (Oxford University press)

6. Engineering Physics by Sanjay D Jain and Girish G Sahasrabudhe (University Press)

7. Engineering Physics by B.K.Pandey & S. Chaturvedi (Cengage Learning )

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