

PH8151 ENGINEERING PHYSICS SYLLABUS

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UNIT I PROPERTIES OF MATTER 9

Elasticity – Stress-strain diagram and its uses - factors affecting elastic modulus and tensile strength – torsional stress and deformations – twisting couple - torsion pendulum: theory and experiment - bending of beams - bending moment – cantilever: theory and experiment – uniform and non-uniform bending: theory and experiment - I-shaped girders - stress due to bending in beams.

UNIT II WAVES AND FIBER OPTICS 9

Oscillatory motion – forced and damped oscillations: differential equation and its solution – plane progressive waves – wave equation. Lasers: population of energy levels, Einstein's A and B coefficients derivation – resonant cavity, optical amplification (qualitative) – Semiconductor lasers: homojunction and heterojunction – Fiber optics: principle, numerical aperture and acceptance angle - types of optical fibres (material, refractive index, mode) – losses associated with optical fibers - fibre optic sensors: pressure and displacement.

UNIT III THERMAL PHYSICS 9

Transfer of heat energy – thermal expansion of solids and liquids – expansion joints – bimetallic strips - thermal conduction, convection and radiation – heat conduction in solids – thermal conductivity – Forbe's and Lee's disc method: theory and experiment - conduction through compound media (series and parallel) – thermal insulation – applications: heat exchangers, refrigerators, ovens and solar water heaters.

UNIT IV QUANTUM PHYSICS 9

Black body radiation – Planck's theory (derivation) – Compton effect: theory and experimental verification – wave particle duality – electron diffraction – concept of wave function and its physical significance – Schrödinger's wave equation – time independent and time dependent equations – particle in a one-dimensional rigid box – tunnelling (qualitative) - scanning tunnelling microscope.

UNIT V CRYSTAL PHYSICS 9

Single crystalline, polycrystalline and amorphous materials – single crystals: unit cell, crystal systems, Bravais lattices, directions and planes in a crystal, Miller indices – inter-planar distances - coordination number and packing factor for SC, BCC, FCC, HCP and diamond structures - crystal imperfections: point defects, line defects – Burger vectors, stacking faults – role of imperfections in plastic deformation - growth of single crystals: solution and melt growth techniques.

TEXT BOOKS:

1. Bhattacharya, D.K. & Poonam, T. —Engineering PhysicsII. Oxford University Press, 2015.
2. Gaur, R.K. & Gupta, S.L. —Engineering PhysicsII. Dhanpat Rai Publishers, 2012.
3. Pandey, B.K. & Chaturvedi, S. —Engineering PhysicsII. Cengage Learning India, 2012.

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For Questions, Notes, Syllabus & Results

REFERENCES:

1. Halliday, D., Resnick, R. & Walker, J. —Principles of PhysicsII. Wiley, 2015.
2. Serway, R.A. & Jewett, J.W. —Physics for Scientists and EngineersII. Cengage Learning, 2010.
3. Tipler, P.A. & Mosca, G. —Physics for Scientists and Engineers with Modern Physics'. W.H.Freeman, 2007.