

ENGINEERING PHYSICS

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Objective of the Course :

There is a symbiotic relation between physics and engineering. Broadly speaking, engineering is mainly applied physics. Recent technical developments have been the result of joint efforts of physicists and engineers. A proper study of physics is therefore indispensable for an engineering student to excel in his field. The purpose of this course is to present the principles and concepts of physics as relevant to an engineer.

UNIT - I

Physical Optics : Interference – Types - Interference in thin films (Reflection) – Newton's Rings – Michelson's Interferometer, Fabry-perot interferometer – Applications.

Diffraction – Fraunhofer Diffraction at single slit – Diffraction grating

Polarization – Production of plane polarized light – Nicol prism – Optical activity – photo elasticity.

UNIT - II

Ultrasonics : Introduction – production of ultrasonic waves – piezoelectric method – Properties of ultrasonic waves – Types of ultrasonic waves – Determination of Velocity of ultrasonic waves in solids and liquids – Applications.

NDT : Introduction - Types – Theory and practice of Ultrasonic Testing – Ultrasonic Testing Systems – Ultrasonic Testing Methods – X-Ray Radiography.

UNIT - III

Quantum Mechanics : Matter waves - Schrodinger's time independent wave equation - Physical significance of the wave function - Particle in one dimensional potential well – tunneling phenomenon.

Free electron theory of metals : Introduction – Classical free electron theory – Electrical conductivity of metal – Fermi - Dirac distribution function and its variation with temperature – Quantum free electron theory.

UNIT – IV**Lasers & Holography :**

Lasers: Characteristics of Laser light – Spontaneous and Stimulated emission of radiation – Low power and High power lasers, He-Ne Laser – CO₂ Laser – Nd-Yag laser - Applications of Lasers.

Holography and Applications

Fiber Optics: Principle of optical fiber - materials – Numerical Aperture – Types of fibers – Dispersion and Attenuation in optical fibers – Optical sensors – Optical fiber communication system.

UNIT –V

Solar Energy : Solar radiation – Photovoltaic effect – solar cells – Efficiency of solar cell – Solar thermal energy conversion systems.

NanoScience & Technology : Introduction to nano materials – Basic principles of nanoscience & Technology – Fabrication of nanomaterials – Physical & Chemical properties of nanomaterials – Applications of nanotechnology.

TEXT BOOKS :

1. Halliday, Resnic and Walker, "Fundamentals of Physics", 6th edition, John Wiley publishers, 2003.
2. M.R.Srinivasan, "Physics for Engineers" New Age International, 2002-2003.
3. M.N. Avadhanulu & P.G. Kshirasagar, "Engineering Physics", 1st edition, S. Chand & Company Ltd, 1992.
4. Sukhatme S.P, "Solar Energy", II Edition, TMH publication, 2005.

REFERENCE BOOKS :

1. Grawfor F.S., Berkley Physics courses, "Waves and Oscillations", Volume III McGraw Hill, 1992.
2. V. Raghavan, "Materials Science and Engineering", 5th edition, Prentice-Hall India, 2004.
3. S.O.Pillai, "Solid State Physics", 6th edition, New Age International Publications, Revised, 2005.
4. V.Rajendran, "Engineering Physics", 1st edition, TMH Publications, 2010.