

APPLIED PHYSICS-II

L T P

4 - 2

RATIONALE

Applied physics includes the study of a large number of diverse topics related to things that go in the world around us. It aims to give an understanding of this world both by observation and prediction of the way in which objects behave. Concrete use of physical principles and analysis in various fields of engineering and technology are given prominence in the course content.

DETAILED CONTENTS

- 1. Waves and vibrations (8 hrs)**
 - 1.1 Waves, Generation of waves by vibrating particles.
 - 1.2 Types of wave motion, transverse and longitudinal wave motion with examples
 - 1.3 Relation between velocity of wave, frequency and wave length of a wave ($v = \eta\lambda$)
 - 1.4 Simple harmonic motion: definition, expression for displacement, velocity, acceleration, time period, frequency in S.H.M.
 - 1.5 Vibration of spring mass system, cantilever and determination of their time period.
 - 1.6 Free, forced and resonant vibrations with examples

- 2. Applications of sound waves (8 hrs)**
 - 2.1 Acoustics of buildings-reverberation, reverberation time, echo, noise, coefficient of absorption of sound, methods to control reverberation time
 - 2.2 Ultrasonics-Methods of production (magnetostriction and piezoelectric) and their engineering applications to cold welding, drilling, cleaning, flaw detection and SONAR
- 3. Principles of optics (8 hrs)**
 - 3.1 Review of concept of mirrors, lenses, reflection & refraction of light, refractive index, lens formula (no derivation), real and virtual image, magnification.
 - 3.2 Power of lens
 - 3.3 Simple and compound microscope, astronomical telescope, magnifying power and its calculation (in each case)
 - 3.4 Total internal reflection, critical angle and conditions for total internal reflection.
- 4. Electrostatics (10 hrs)**
 - 4.1 Coulomb's law, unit charge
 - 4.2 Gauss's Law
 - 4.3 Electric field intensity and electric potential
 - 4.4 Electric field of point charge, charged sphere, straight charged conductor, plane charged sheet
 - 4.5 Capacitance, types of capacitors, capacitance of parallel plate capacitor, series and parallel combination of capacitors
 - 4.6 Dielectric and its effect on capacitors, dielectric constant and dielectric

- 5. Current Electricity (8 hrs)**
 - 5.1 Ohm's law
 - 5.2 Resistance of a conductor, specific resistance, series and parallel Combination of resistors, effect of temperature on resistance

- 5.3 Kirchhoff's laws, Wheatstone bridge principle and its applications
- 5.4 Heating effect of current and concept of electric power

6. Semi conductor physics

(8 hrs)

- 6.1 Energy bands, intrinsic and extrinsic semi conductor, p-n junction diode and its characteristics
- 6.2 Diode as rectifier-half wave and full wave rectifier, semi conductor transistor pnp and npn (concept only)

7. Modern Physics

(9 hrs)

- 7.1 Lasers: concept of energy levels, ionizations and excitation potentials; spontaneous and stimulated emission; lasers and its characteristics, population inversion, types of lasers, ruby laser and applications
- 7.3 Fiber optics: Introduction and applications
- 7.4 Super conductivity: Phenomenon of super conductivity, Type I and Type II super conductor and its applications

LIST OF PRACTICALS

1. To determine and verify the time period of cantilever by drawing graph between load and depression
2. To determine the magnifying power of a compound microscope
3. To determine the magnifying power of an astronomical telescope
4. To verify Ohm's law
5. To verify law of resistances in series
6. To verify law of resistances in parallel
7. To convert a galvanometer into an ammeter of given range
8. To convert a galvanometer into a voltmeter of a given range

RECOMMENDED BOOKS

1. Concept of Physics Prof. H.C. Verma, Part-1 (Bharti Bhawan)
2. Concept of Physics, Prof. H.C. Verma, Part-2 (Bharti Bhawan)
3. A Text Book of Applied Physics: Egale Parkashan, Jullandhar