

2.3 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.

Note:- Teachers should give examples of engineering/technology applications of various concepts and principles in each topic so that students are able to appreciate learning of these concepts and principles.

DETAILED CONTENTS

- 1. Waves and Vibrations** (10 hrs)
 - 1.1. Definition of wave with examples
 - 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 ($v = n\lambda$)
 - 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** (10 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 oscillator only) and their engineering applications to cold welding, drilling, cleaning and SONAR

- 3. Principles of Optics** (10 hrs)
 - 3.1 Lenses, reflection & refraction of light, refractive index, lens formula (no derivation), real and virtual image, magnification.
 - 3.2 Power of lens, microscope, telescope (definition only)
 - 3.3 Total internal reflection, critical angle and conditions for total internal reflection.

4. Electrostatics (12 hrs)

- 4.1 Coulomb's law, unit charge
- 4.2 Gauss's Law
- 4.3 Electric field intensity and electric potential (definition and units only)
- 4.4 Application of Gauss's Law to straight charged conductor, plane charged sheet
- 4.5 Capacitance, capacitance of parallel plate capacitor, series and parallel combination of capacitors
- 4.6 Dielectric and its effect on capacitors, dielectric constant and dielectric breakdown

5. Current Electricity (10 hrs)

- 5.1 Definition of electric current, resistance, potential & their units.
- 5.2 Ohm's law
- 5.3 Specific resistance, series and parallel combination of resistances, effect of temperature on resistance.
- 5.4 Kirchhoff's laws, Wheatstone bridge
- 5.5 Heating effect of current and concept of electric power

6. Semi Conductor Physics (6 hrs)

- 6.1 Types of materials (insulator, semi-conductor, conductor), 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 (introduction only)

7. Modern Physics (6 hrs)

- 7.1 Lasers: concept of energy levels, ionizations and excitation potentials; spontaneous and stimulated emission; population inversion, Laser, types of lasers, ruby laser and applications of laser
- 7.2 Fiber optics: Introduction and applications
- 7.3 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.
- 2. To determine time period of Simple Pendulum.
- 3. To verify ohm's law.
- 4. To verify law of resistance in series.
- 5. To verify law of resistances in parallel.
- 6. To find resistance of galvanometer by half deflection method.
- 7. To convert a galvanometer into an ammeter of given range.
- 8. To convert a galvanometer into a voltmeter of given range.
- 9. To study and verify laws of reflection using mirrors.

INSTRUCTIONAL STRATEGY

Teacher may use various instructional media like models, charts and graphs while imparting instructions. The field application should be made clear before teaching the basics of waves, sound, light, electrostatics, semiconductor and modern physics etc to develop proper understanding of the physical phenomenon. Use of demonstration will make the subject interesting and develop scientific temper in the students.

RECOMMENDED BOOKS

1. Concept of Physics by H.C. Verma, Part-1, Bharti Bhawan, New Delhi
2. Concept of Physics by H.C. Verma, Part-2, Bharti Bhawan, New Delhi
3. A Text Book of Applied Physics by RA Banwat and SD Dogra, Eagle Parkashan, Jalandhar
4. Applied Physics by BL Arora, King India Publications, New Delhi

SUGGESTED DISTRIBUTION OF MARKS

S.No	Time Allotted (Hrs.)	Marks Allotted (%)
1	10	14
2	10	14
3	10	14
4	12	20
5	10	16
6	06	12
7	06	10
Total	64	100