

2.3 APPLIED PHYSICS – II

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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

DETAILED CONTENTS

1. Optics (10 hrs)
 - 1.1 Review of basic optics laws: reflection and refraction
 - 1.2 Refraction and refractive index, image formation in lenses, image magnification, lens formulae (thin lens only), power of lens, total internal reflection and their applications
 - 1.3 Simple and compound microscope, astronomical telescope, magnifying power and its calculation (in each case), Terrestrial and Galileo's telescope (Concept only) and their applications
2. Electrostatics (12 hrs)
 - 2.1 Coulombs law, unit of charge, electric potential and electric potential difference
 - 2.2 Electric field, electric field intensity, electric lines of force, electric flux Gauss's Law
 - 2.3 Applications of Gauss law in finding electric field of point charge, straight charged conductor, plane charged sheet and between two plane parallel charged sheets
 - 2.4 Capacitance, types of capacitors, capacitance of parallel plate capacitor, series and parallel combination of capacitors, Dielectric and its effect on capacitance, and dielectric break down
 - 2.5 Application of electrostatics in electrostatic precipitator
3. DC Circuits (12 hrs)
 - 3.1 Concept of electricity, current and its units, direct and alternating current, voltage, resistance, potential difference and e.m.f,

- 3.2 Ohm's law and its applications, concept of resistance, conductance, specific resistance, effect of temperature on resistance, co-efficient of resistance, series and parallel combination of resistors, introduction to super conductivity.
 - 3.3 Kirchhoff's laws, Wheatstone bridge principle and its applications (Slide Wire Bridge)
 - 3.4 Heating effect of current and concept of electric power, energy and their units, related numerical problems
 - 3.5 Application of electricity in various equipments, advantages of electrical energy over other forms of energy
4. Electromagnetism (13 hrs)
- 4.1 Magnetic field and its units, magnetic intensity, magnetic lines of force, magnetic flux and their units, Right hand thumb rule, magnetic lines of force due to straight conductor, circular coil and solenoid
 - 4.2 Force on a charge, moving in a uniform magnetic field (Lorentz force). Force on a current carrying straight conductor. Torque on a current carrying rectangular coil.
 - 4.3 Moving coil galvanometer conductor, its principle, construction and working, conversion of a galvanometer into ammeter and voltmeter.
 - 4.4 Electromagnetic induction, Faradays Laws, Lenz's Law.
 - 4.5 Applications of Electromagnetism
5. Semiconductor physics (07 hrs)
- 5.1 Energy bands, intrinsic and extrinsic semiconductors, p-n junction diode and its characteristics
 - 5.2 Diode as rectifier – half wave and full wave rectifier, semiconductor transistor pnp and npn (concept only)
6. Modern Physics (10 hrs)
- 6.1 Electro magnetic spectrum, photo electric effect and work function, X rays - properties, production and their applications in medicine and industries.
 - 6.2 Lasers: concept of energy levels, ionizations and excitation potentials; spontaneous and stimulated emission; lasers and its characteristics, population inversion, types of lasers, Helium- Neon and ruby lasers, their engineering and medical applications

- 6.3 Fibre optics: introduction to optical fiber materials, types, light propagation and applications in communication.

LIST OF PRACTICALS (To perform minimum eight experiments)

1. To find the focal length of convex lens by displacement method.
2. To determine the magnifying power of an astronomical telescope
3. Conversion of Galvanometer into an Ammeter of given range.
4. Conversion of Galvanometer into Voltmeter of given range.
5. To verify ohm's laws by drawing a graph between voltage and current.
6. To verify laws of resistances in series and in parallel connection.
7. To find resistance of galvanometer by half deflection method
8. To measure very low resistance and very high resistance using Wheat Stone bridge
9. To find the time constant of a capacitor
10. To draw characteristics of a pn junction diode and determine knee and break down voltages
11. To find wave length of He Ne semiconductor laser.

INSTRUCTIONAL STATREGY

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, dc circuits, electromagnetism, and semiconductor physics etc to develop proper understanding of the physical phenomenon. Use of demonstration can make the subject interesting and develop scientific temper in the students.

RECOMMENDED BOOKS

1. Text Book of Physics for Class XI (Part-I, Part-II) N.C.E.R.T
2. Applied Physics, Vol. I and Vol. II, TTTI Publications, Tata McGraw Hill, Delhi
3. Concepts in Physics by HC Verma, Vol. I & II, Bharti Bhawan Ltd. New Delhi
4. Fundamentals of Physics by Resnick, Halliday and Walker, Asian Book Pvt. Ltd., New Delhi
5. Fundamentals of Optics by Francis A. Jenkins & Harvey E White, McGraw Hill International Editions, Physics Series
6. A Text Book of Optics, Subramanian and Brij Lal, S Chand & Co., New Delhi
7. Comprehensive Practical Physics, Vol, I & II, JN Jaiswal, Laxmi Publishers

8. Engineering Physics by PV Naik, Pearson Education Pvt. Ltd, New Delhi
9. Applied Physics I & II by RA Banwait & R Dogra, Eagle Parkashan, Jalandhar
10. Applied Physics Vol II by Jasmer Kaur and Bhupinder Singh, Lords Publications, Jalandhar
11. Basic Electronics and Linear Circuits by NN Bhargava et al Tata Mc Graw Hill Publishers, New Delhi
12. Principles of Electronics by SK Sahdev, Dhanpat Rai and Co, New Delhi
13. Engineering Physics by Vanchna Singh and Sheetal Kumar, Cengage Learning India Pvt. Ltd. Patparganj, Delhi (year 2008)

SUGGESTED DISTRIBUTION OF MARKS FOR FACILITATING PAPER SETTER

| Sr No | Topic | Time Allotted (Hrs) | Marks Allotted (%) |
|--------------|-----------------------|----------------------------|---------------------------|
| 1 | Optics | 10 | 15 |
| 2 | Electrostatics | 12 | 20 |
| 3 | DC Circuits | 12 | 20 |
| 4 | Electromagnetism | 13 | 20 |
| 5 | Semiconductor Physics | 07 | 10 |
| 6 | Modern Physics | 10 | 15 |
| | Total | 64 | 100 |