BSPH-104 Applied Physics- II L T P C = 2 1 0 3

Total Theory Load: 4 months (48 Hours) (36 L + 12 T) (To the Maximum)

Course Outcomes:

After successful completion of the course, the students should be able to

- CO1: Understand the basics of physics in prescribed syllabus.
- CO2: Know the conceptual physics and its use in solving the physical problems.
- CO3: Apply the principles of physics.
- CO4: Describe the physics in his /her words.
- CO5: Identify the reasons for physical happenings.
- CO6: Preparing for vocational skills at diploma level
- CO7: Standardization of the knowledge acquired

CO/PO Mapping

1 (S)-strong, 2(M)-medium and 3(W)-weak indicate the strength of correlation

COs	Programme outcomes (POs)											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	1	2	1	3	1	2	2	2	2	3	2	1
CO2	1	2	1	2	1	2	2	3	2	2	2	3
CO3	1	1	1	2	2	2	3	2	2	3	3	3
CO4	2	1	2	2	3	2	3	3	3	3	3	3
CO5	1	1	1	2	2	3	2	3	3	2	3	3
CO6	1	1	2	2	1	2	3	3	2	3	3	3
CO7	2	1	1	2	2	3	3	3	3	3	3	2

BSPH-104 **APPLIED PHYSICS- II**

L	T	P	C
2	1	0	3

Total Theory Load: 4 months (48 Hours) (36 L +8T)

UNIT-I

ELECTROSTATICS: Coulomb's law (scalar & vector form), dielectric constant, electric field, electric field due to a point charge, electric dipole and its moment, Gauss's theorem and its applications to find electric field due to charged wire and plane sheet of charge. Electric potential, electric potential energy, electric potential and potential energy due to point charge; capacitance, parallel plate capacitor with air/dielectric medium between plates, series and parallel combinations of capacitors, energy stored in a capacitor. Simple numerical problems. ***6 Lectures***

CURRENT ELECTRICITY: Resistance, resistivity, ohms law, combination of resistances in series and parallel, Kirchhoff's laws, internal resistance of cell (say Volta cell), emf and potential difference, principle of potentiometer and its application for comparing e.m.f. of two cells. Simple numerical problems. ***6 Lectures***

ELECTROMAGNETIC INDUCTION AND THERMAL & MAGNETIC EFFECTS OF CURRENT: Faraday's laws of electromagnetic induction, induced e.m.f., Lenz's law, self and mutual induction. Electric energy and power, Joule's law of heating, thermoelectricity (Seeback effect), Biot-Savart's law, magnetic field due to a straight wire, Flemings left hand rule, definition of Ampere, elementary idea of moving coil galvanometer and its conversion into ammeter and voltmeter. Simple numerical problems. ***6 Lectures***

UNIT-II

OPTICS (RAY AND WAVE): Wave front: spherical, cylindrical and plane wave fronts, Huygen's principle and its application to laws of reflection and refraction of light; interference of light, Young's double slit experiment, coherent source of light, diffraction of light, diffraction due to a single slit; polarization of light (general idea) Simple numerical problems. ***6 Lectures***

SEMICONDUCTOR PHYSICS: Energy bands, intrinsic and extrinsic semiconductors, p-n junction diode and its characteristics. Diode as rectifier-half wave and full wave rectifier, applications of semiconductor devices: battery charger, computer chips and other electronic appliances. ***6 Lectures***

MODERN PHYSICS: Dual nature of matter, de Broglie waves, photo electric effect and work function, X-rays-properties, production and their applications in medicine and industries, spontaneous and stimulated emissions, lasers and its characteristics, population inversion, types of lasers, He-Ne and Ruby lasers (basic concept) and their engineering and medical applications, Introduction to optical fiber and its applications. Simple numerical problems. ***6 Lectures***

Recommended Books:

Author	Title	Publisher
NCERT	Physics for XII	NCERT New Delhi
Haliday and Resnick and Walker	Fundamentals of Physics	John Wiley & Sons
K L Gomber and K L Gogia	Fundamental Physics Class (XII)	Pardeep Publications
S. K. Gupta	ABC of Physics, Class (XII)	Modern Publications

Proposed lecture plan:

ELECTROSTATICS:

Coulomb's Law (1 hour)

- Explanation of Coulomb's law in scalar and vector forms
- Understanding the force between point charges
- Application of Coulomb's law in determining electrostatic force

Dielectric Constant and Electric Field (0.5 hour)

- Definition and explanation of dielectric constant
- Introduction to electric field and its properties
- Calculation of electric field due to point charges

Electric Dipole and Gauss's Theorem (1 hour)

- Explanation of electric dipole and its moment
- Statement and application of Gauss's theorem
- Determination of electric field due to charged wire and plane sheet of charge using Gauss's theorem

Electric Potential and Energy (0.5 hour)

- Definition and explanation of electric potential
- Relationship between electric potential and electric potential energy
- Calculation of electric potential and potential energy due to point charges

Capacitance and Capacitors (2 hour)

- Definition and explanation of capacitance
- Introduction to capacitors and parallel plate capacitors
- Series and parallel combinations of capacitors
- Calculation of energy stored in capacitors

Numerical Problems (1 hour)

- Practice solving numerical problems related to the topics covered

CURRENT ELECTRICITY:

Resistance and Resistivity (0.5 hour)

- Definition and explanation of resistance
- Understanding resistivity and its significance
- Calculation of resistance using resistivity

Ohm's Law (1 hour)

- Statement and explanation of Ohm's law
- Application of Ohm's law in circuits
- Calculations involving voltage, current, and resistance

Combination of Resistances (1 hour)

- Explanation of resistances in series and parallel
- Calculation of equivalent resistance for series and parallel combinations
- Applications of series and parallel combinations in circuits

Kirchhoff's Laws (1.5 hour)

- Statement and explanation of Kirchhoff's laws (Kirchhoff's voltage law and Kirchhoff's current law)
- Application of Kirchhoff's laws in circuit analysis

Internal Resistance of Cell and EMF (0.5 hour)

- Understanding internal resistance of a cell (e.g., Voltaic cell)
- Explanation of electromotive force (EMF) and potential difference
- Calculations involving EMF and potential difference

Potentiometer and its Applications (1 hour)

- Principle of potentiometer
- Application of potentiometer in comparing EMF of two cells
- Understanding the working principle and setup of a potentiometer

Numerical Problems (0.5 hour)

- Practice solving numerical problems related to the topics covered

ELECTROMAGNETIC INDUCTION AND THERMAL & MAGNETIC EFFECTS OF CURRENT:

Faraday's Laws of Electromagnetic Induction (0.5 hour)

- Explanation of Faraday's laws of electromagnetic induction
- Understanding induced electromotive force (emf)
- Application of Faraday's laws in various scenarios

Lenz's Law and Self-Induction (1 hour)

- Statement and explanation of Lenz's law
- Understanding self-induction and its effects
- Calculation of induced emf due to self-induction

Mutual Induction (0.5 hour)

- Definition and explanation of mutual induction
- Understanding mutual inductance
- Calculation of induced emf due to mutual induction

Electric Energy, Power, and Joule's Law (0.5 hour)

- Definition and explanation of electric energy and power
- Application of Joule's law of heating
- Calculation of heat produced in a resistor

Thermoelectricity and Biot-Savart's Law (1 hour)

- Introduction to thermoelectricity (Seebeck effect)
- Explanation of Biot-Savart's law
- Calculation of magnetic field due to a straight wire using Biot-Savart's law

Magnetic Field and Fleming's Left-Hand Rule (0.5 hour)

- Understanding magnetic field due to a current-carrying wire
- Explanation and application of Fleming's left-hand rule
- Definition and explanation of Ampere

Moving Coil Galvanometer and its Applications (1.5 hour)

- Introduction to moving coil galvanometer
- Conversion of moving coil galvanometer into ammeter and voltmeter
- Understanding the working principle and applications of galvanometers

Numerical Problems (0.5 hour)

- Practice solving numerical problems related to the topics covered

OPTICS (RAY AND WAVE):

Wave Fronts and Huygens' Principle (2 hours)

- Explanation of spherical, cylindrical, and plane wave fronts
- Introduction to Huygens' principle and its application in wave propagation
- Application of Huygens' principle to the laws of reflection and refraction of light

Interference of Light (1.5 hour)

- Understanding interference phenomena in light waves
- Explanation of Young's double-slit experiment
- Introduction to coherent sources of light
- Calculation of interference patterns in double-slit setups

Diffraction of Light (1.5 hour)

- Explanation of diffraction phenomena in light waves
- Understanding diffraction due to a single slit
- Calculation of diffraction patterns from single-slit setups

Polarization of Light (0.5 hour)

- Introduction to polarization of light
- General idea of polarizers and polarization mechanisms
- Applications of polarization in various fields

Numerical Problems (0.5 hour)

- Practice solving numerical problems related to the topics covered

SEMICONDUCTOR PHYSICS:

Explanation of energy bands in solids (0.5 hour)

- Understanding valence and conduction bands
- Introduction to band gap and its significance

Intrinsic and Extrinsic Semiconductors (1 hour)

- Definition and explanation of intrinsic and extrinsic semiconductors
- Introduction to doping and its effects on semiconductor properties
- Understanding of n-type and p-type semiconductors

PN Junction Diode and its Characteristics (2 hours)

- Explanation of PN junction diode
- Understanding forward and reverse biasing
- Characteristics of PN junction diode (I-V characteristics)
- Application of PN junction diode in electronic circuits

Diode as Rectifier (1 hour)

- Explanation of diode rectification
- Introduction to half-wave and full-wave rectifiers

Applications of Semiconductor Devices (1.5 hours)

- Explanation of various applications of semiconductor devices
- Examples include battery chargers, computer chips, and other electronic appliances
- Understanding the role of semiconductors in modern technology

MODERN PHYSICS:

Dual Nature of Matter and De Broglie Waves (1 hour)

- Explanation of the dual nature of matter and wave-particle duality
- Introduction to De Broglie waves and their significance
- Understanding the wavelength associated with particles

Photoelectric Effect and Work Function (1 hour)

- Explanation of the photoelectric effect
- Understanding the concept of work function
- Application of photoelectric effect in various fields

X-rays: Properties, Production, and Applications (0.5 hour)

- Understanding properties of X-rays (e.g., penetration, ionization)
- Explanation of X-ray production mechanisms
- Applications of X-rays in medicine and industries

Spontaneous and Stimulated Emissions, Lasers (1.5 hours)

- Explanation of spontaneous and stimulated emissions
- Introduction to lasers and their characteristics
- Understanding population inversion and its role in laser operation

Types of Lasers, He-Ne, and Ruby Lasers (1 hour)

- Explanation of different types of lasers (e.g., gas lasers, solid-state lasers)
- Detailed explanation of He-Ne and Ruby lasers
- Engineering and medical applications of lasers

Introduction to Optical Fiber and its Applications (0.5 hours)

- Explanation of optical fibers and their properties
- Applications of optical fibers in telecommunications, medicine, and industries

Numerical Problems (0.5 hour)

- Practice solving numerical problems related to the topics covered