U.G. PROGRAM B. Sc. Physics (Hons.)

SEM-IV-P-I

Electrostatics & Magneto statics

SUBJECT CODE	Category	SUBJECT NAME	TEACHING &EVALUATION SCHEME								
			THEORY			PRACTICAL		Th	T	P	CREDITS
			End Sem University Exam	Two Term Exam	Teachers Assessment *	End Sem University Exam	Teachers Assessment*				
BSPH402	DC	Electrostatics & Magneto statics	60	20	20	30	20	3	1	4	6

Legends: L - Lecture; T - Tutorial/Teacher Guided Student Activity; P – Practical; C - Credit;
Q/A – Quiz/Assignment/Attendance, MST MidSem Test.
*Teacher Assessment shall be based on following components: Quiz/Assignment/ Project/Participation in class (Given that no component shall be exceed 10 Marks)

Course Objectives:-

1. To develop the comprehensive understanding of laws of physics related to,Electrostatics,Magnetostatics and ability to apply them for laying the foundation for research and development.
2. To work ethically as member as well as leader in a diverse team.

Course Outcomes:-

1. Student will be able to understand and solve the problems related toElectrostatics.
2. Student will be able to understand and solve the problem related toMagnetostatics
3. Student will be able to determine physical parameter experimentally with optimal usage of resources and complete the assignments in time.

BSPH 402-Electrostatics &Magnetostatics

Unit-1

Electric Circuits AC Circuits: - Complex Reactance and Impedance. Series LCR Circuit: Resonance, Power Dissipation and Quality Factor. and Band Width. Parallel LCR Circuit.Network theorems: - Ideal Constant-voltage and Constant-current Sources. Network Theorems: Thevenin theorem, Norton theorem, Superposition theorem, Reciprocity theorem, and Maximum Power Transfer theorem

Unit-2

Electrostatics Coulombs law in vacuum expressed in vector forms, calculations of electric field E for simple distributions of charge at rest, dipole and quadruple fields. Relation between electric field & electric potential ($E = -\nabla V$), torque on a dipole in a uniform electric field and its energy, flux of the electric field, Gauss's law and its application.. Dielectrics, parallel plate capacitor with a dielectric, dielectric constant, polarization and polarization vector P, relation between displacement vector D, E and P. Molecular interpretation ofClaussius-Mossotti equation

Unit-3

Magnetostatics Force on a moving charge, Lorentz force equation and definition of B, force on a straight conductor carrying current in a uniform magnetic field, torque on a current loop, magnetic dipole moment, angular momentum and gyro magnetic ratio, Biot and Savart's law, Electromagnetic induction, Faraday's Laws, Electromotive force, Integral and differential forms of Faraday's laws, Self and mutual inductance, Transformers, Energy in a static magnetic field, Maxwell's displacement current, Derivations of Maxwell's equations, Electromagnetic field energy density. Poynting vector,

Unit-4

Current Electricity: Steady current, current density J, non-steady currents and continuity equation, Kirchoff's laws and analysis of multi loop circuits, growth and decay of current in LR and CR circuits, decay constants, LCR circuits. AC circuits, complex numbers and their applications in solving AC circuits problems, complex impedance and reactance, series and parallel resonance. Q-factor, power consumed by an A.C. circuit, power factor, Y and Δ networks and transmission of electric power.

Unit-5

Dielectric Properties of Matter Dielectrics:- Electric Field in Matter. Dielectric Constant.Parallel Plate Capacitor with a Dielectric.Polarization, Polarization Charges and Polarization Vector.Electric Susceptibility.Gauss's law in Dielectrics.Displacement vector D. Relations between the three Electric Vectors. Capacitors filled with Dielectrics.

References:

1. Introduction to Electrodynamics: David J. Griffiths, 4th Edition, Printice Hall.
2. Classical Electrodynamics: Jhon David Jackson, Jhon Wiley & Sons.
3. Electrodynamics: Emi Cossor&Bassin Lorraine, Asahi Shimbunsha Publishing Ltd.
4. From Neuron to Brain: Kuffler and Nicholas, Sinauer Associates, Inc Pub. Sunderland, Masschuetts (Reference for topics of Bioelectricity) Department of Higher Education, Government of Mad

List of Experiments:

1. Hall probe method for measurement of resistivity.
2. To Study Series Resonance CKT
3. Charging and discharging of Capacitor through resistance
4. Study of B-H Curve (Magneto statics)
5. To study Parallel Resonance
6. Measurement of Frequency of A.C. mains by electrically maintained vibrating rod.(Electromagnetic induction)
7. Growth and decay of current in LR
8. Determination of e/m using Thomson's method.
9. Verification of Thevenin theorem
10. Verification of Norton theorem
11. Verification of Superposition theorem
12. Verification of Maximum Power Transfer theorem.

Shri Vaishnav Vidyapeeth Vishwavidyalaya, Indore

U.G. PROGRAM B. Sc. Physics (Hons.)

SEM-IV-P-II

Thermodynamics

SUBJECT CODE	Category	SUBJECT NAME	TEACHING & EVALUATION SCHEME								
			THEORY			PRACTICAL		Th	T	P	CREDITS
			End Sem University Exam	Two Term Exam	Teachers Assessment	End Sem University Exam	Teachers Assessment				
BSPHPH403	DC	Thermodynamics	60	20	20	0	0	4	0	0	4

Course Objectives:-

- To develop the comprehensive understanding of laws of Thermodynamics and ability to apply them for laying the foundation for research and development.
- To work ethically as member as well as leader in a diverse team.

Course Outcomes:-

- Student will be able to understand and solve the problems related to Thermodynamics.
- Student will be able to determine physical parameter experimentally with optimal usage of resources and complete the assignments in time.

Shri Vaishnav Vidyapeeth Vishwavidyalaya, Indore

BSPHPH403:Thermodynamics

UNIT 1Introduction to Thermodynamics Zeroth and First Law of Thermodynamics: Extensive and intensive Thermodynamic Variables, Thermodynamic Equilibrium, Concept of Temperature, Concept of Work & Heat, State Functions, Internal Energy, and Applications of First Law: General Relation between C_P and C_V, Work Done during Isothermal and Adiabatic Processes, Compressibility and Expansion Co-efficient.

UNIT 2Second Law of Thermodynamics: Reversible and Irreversible process with examples. Conversion of Work into Heat and Heat into Work.Heat Engines.Carnot's Cycle, Carnot engine & efficiency, Refrigerator & coefficient of performance, 2nd Law of Thermodynamics: Kelvin-Planck and Clausius Statements and their Equivalence. Carnot's Theorem. Applications of Second Law of Thermodynamics: Thermodynamic Scale of Temperature and its Equivalence to Perfect Gas Scale.

UNIT 3Etropy: Concept of Entropy, Clausius Theorem. Clausius Inequality, Second Law of Thermodynamics in terms of Entropy.Entropy of a perfect gas.Principle of Increase of Entropy, Entropy Changes in Reversible and Irreversible processes with examples, Entropy of the Universe.Entropy Changes in Reversible and Irreversible Processes.Principle of Increase of Entropy, Temperature–Entropy diagrams for Carnot's Cycle. Third Law of Thermodynamics, Unattainability of Absolute Zero

UNIT 4Thermodynamic Potentials: Thermodynamic Potentials: Internal Energy, Enthalpy, Helmholtz Free Energy, Gibb's Free Energy, Cooling due to adiabatic demagnetization, First and second order Phase Transitions with examples, ClausiusClapeyron Equation and Ehrenfest equations

UNIT 5 Maxwell's Thermodynamic Relations: Derivations and applications of Maxwell's Relations, Maxwell's Relations:(1) ClausiusClapeyron equation, (2) Values of Cp-Cv, (3) TdS Equations, (4) Joule-Kelvin coefficient for Ideal and Van der Waal Gases, (5) Energy equations, (6) Change of Temperature during Adiabatic Process. Kinetic Theory of Gases Distribution of Velocities: Maxwell-Boltzmann Law of Distribution of Velocities in an Ideal Gas and its Experimental Verification.

Reference Books:

1. Heat and Thermodynamics, M.W. Zemansky, Richard Dittman, 1981, McGraw-Hill.
2. A Treatise on Heat, MeghnadSaha, and B.N.Srivastava, 1958, Indian Press
3. Thermal Physics, S. Garg, R. Bansal and Ghosh, 2nd Edition, 1993, Tata McGraw-Hill
4. Modern Thermodynamics with Statistical Mechanics, Carl S. Helrich, 2009, Springer.