

**Government College, Nagda, Distt. – Ujjain (M. P.)**  
**B.Sc. 2nd year major/minor/open elective (Planner)**

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**Class- B.Sc. 2nd year**  
**Session- 2023-24**

**Subject- Physics**

week	TIME	UNIT (no.)	Unit name	(SYLLABUS & TOPICS)
1		1	Electrostatics	Fundamental of electrostatics, Gauss' s law and its applications for finding E for symmetric charge distributions, Capacitors, conducting sphere in a uniform electric field ,point charge in front of a grounded infinite conductor, dielectrics ,parallel plate capacitor with a dielectric, dielectric constant, polarization and polarization vector <b>P</b> , Relation between displacement vector <b>D</b> , <b>E</b> and <b>P</b> .
2		1	Electrostatics	Molecular interpretation of calusius-Mossotti equation, Laplace and Poisson equations in electrostatics and their applications, energy of system of charges, multiple expression of scalar potential method of images and its application. Potential and field due to a dipole, force and torque on a dipole in an external electric field.
3		2	Magnetostatics	Force on a moving charge, Lorentz force equation and definition of <b>B</b> , force on a straight conductor carrying current in a uniform magnetic field, torque on a current loop , magnetic dipole moment, angular momentum and gyromagnetic ratio Biot and Savart's law , calculation of <b>H</b> for simple geometrical situations such as solenoid , and ring
4		2	Magnetostatics	Ampere's law, field due a magnetic dipole, free and bound currents, magnetization vector ( <b>M</b> ), relationship between <b>B,H</b> and <b>M</b> . derivation of

				the relation $\nabla \times \mathbf{M} = \mathbf{J}$ for non-uniform magnetization
5		3	Current electricity and Bioelectricity	Steady current, current density $\mathbf{J}$ , non-steady currents and continuity equation, Kirchhoff's laws and analysis of multi loop circuits, growth and decay of current in LR and CR circuits, decay constant, LCR circuits. mean and RMS values of A.C., AC circuits, complex numbers and their applications in solving AC circuit problems, complex impedance and reactance
6		3	Current electricity and Bioelectricity	Series and parallel resonance. Q-factor, power consumed by an A.C.circuit, power factor, Y and $\Delta$ networks and transmission of electric power. electricity observed in living systems, origin of bioelectricity.
7		4	Motion of charged particles in electric and magnetic fields	E as an accelerating field, electron gun, discharge tube, linear accelerator E as deflecting field — CRO, sensitivity of CRO transverse B field spectrograph and velocity selector, curvatures of tracks for energy determination for nuclear particles;
8		4	Motion of charged particles in electric and magnetic fields	Principle and working of cyclotron. mutually perpendicular and parallel $\mathbf{E}$ & $\mathbf{B}$ fields; positive ray parabolas, discovery of isotopes, Elements of mass spectrographs, Principle of Magnetic focusing (lenses)
9		5	Electrodynamics	Electromagnetic induction, Faraday's law, electromotive force, integral and differential forms of Faraday's law, self and mutual inductance, transformers, energy in a static magnetic field, Maxwell's equations, electromagnetic field energy density. Poynting vector, vector and scalar potentials; electromagnetics field tensors, Fresnel's relations.
10		6	Electrodynamics	Rayleigh scattering. electromagnetic wave equation, plane electromagnetic waves in vacuum and dielectric media, Reflection at a plane boundary of dielectrics, fresnel's laws, polarization by reflection and total internal reflection, waves in a conducting medium, reflection and refraction by the ionosphere

