

# DEPARTMENT OF PHYSICS, GOVERNMENT COLLEGE GURUR, BALOD, C.G.

Name of Faculty – Mr. Lekhram Hirwani  
Designation – Assistant Professor

Yearly Teaching Plan 2022 - 23


Class - B.Sc. 01<sup>st</sup> Year  
Subject – Physics  
Subject Code - 004126

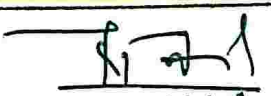
Name of Program, Class and Paper	Syllabus (Mechanics, Oscillations and Properties of Matter)	Required Duration
B.Sc. (PCM) 01 <sup>st</sup> Year Paper – I	<p><b>UNIT – I</b> Cartesian, Cylindrical and Spherical coordinate system, Inertial and non-Inertial frames of reference, uniformly rotating frame, Coriolis force and its applications. Motion under a central force, Kepler's law. Effect of Centrifugal and Coriolis forces due to earth's rotation, center of mass (CM), Lab and C.M. frame of reference, motion of CM of system of particles subject to external forces, elastic and inelastic collisions in one and two dimensions, Scattering angle in the laboratory frame of reference, Conservation of linear and angular momentum, Conservation of energy.</p> <p><b>UNIT – II</b> Rigid body motion, rotational motion, moments of inertia and their products, principal moments and axes, Introductory idea of Euler's equations. Potential well and Periodic Oscillations, case of harmonic small oscillations, differential equation and its solution, kinetic and potential energy, examples of simple harmonic oscillations: spring and mass system, simple and compound pendulum, torsional pendulum.</p> <p><b>UNIT – III</b> Bifilar oscillations, Helmholtz resonator, LC circuit, vibrations of a magnet, oscillations of two masses connected by a spring. Superposition of two simple harmonic oscillators, case of different frequencies. Power dissipation, quality factor, examples, driven (forced) harmonic oscillator, transient and steady states, power absorption, resonance.</p> <p><b>UNIT – IV</b> E as an accelerating field, electron gun, case of discharge tube, linear accelerator, E as deflecting field, CRO sensitivity, Transverse B field, 108° deflection, mass spectrograph, curvatures of tracks for energy determination, principle of a cyclotron, Mutually perpendicular E and B fields: velocity selector, its resolution, Parallel E and B fields, positive ray parabolas, discovery of isotopes, elements of mass spectrography, principle of magnetic focusing lens.</p> <p><b>UNIT – V</b> Elasticity: Strain and stress, elastic limit, Hooke's law, Modulus of rigidity, Poisson's ratio, Bulk modulus, relation connecting different elastic – constants, twisting couple of a cylinder (solid and hollow), Bending moment, Cantilever, Young modulus by bending of beam. Viscosity: Poiseuille's equation of liquid flow through a narrow tube, equations of continuity, Euler's equation, Bernoulli's theorem, viscous fluids, streamline and turbulent flow. Poiseuille's law, Coefficient of viscosity, Stoke's law, Surface tension and molecular interpretation of surface tension, Surface energy, Angle of contact. wetting.</p>	<p><b>12 Hours</b> <b>(40 Min. x</b> <b>18</b> <b>Periods</b> <b>Per Unit)</b> <b>=</b> <b>90 Days</b></p> <p><b>(From</b> <b>August 22</b> <b>to</b> <b>February</b> <b>23)</b></p>

Name of Program, Class and Paper	Syllabus (Electricity, Magnetism and Electromagnetic Theory)	Required Duration
B.Sc. (PCM) 01 <sup>st</sup> Year Paper - II	<p><b>UNIT – I</b>            Repeated Integrals of a function of more than one variable, definition of a double and triple Integral. Gradient of a scalar field and its geometrical Interpretation, divergence and curl of a vector field and their geometrical Interpretation, line, surface and volume Integrals, flux of a vector field, Gauss's divergence theorem, Green's theorem and Stoke's Constant – current Sources. Thevenin theorem, Norton theorem, Superposition theorem, Reciprocity theorem and Maximum Power Transfer theorem.</p> <p><b>UNIT – II</b>            Coulomb's law in vacuum expressed in Vector forms, calculations of E for simple distributions of charges at rest, dipole and quadrupole fields. Work done on a charge in an electrostatic field expressed as a line integral, conservative nature of the electrostatic field. Relation between Electric potential and Electric field, torque on a dipole in a uniform electric field and its energy, flux of the electric field. Gauss's law and its application: E due to (1) an infinite line of charge, (2) a charged cylindrical conductor, (3) an infinite sheet of charge and two parallel charged sheets, capacitors, electrostatic field energy, force per unit area of the surface of a conductor in an electric field, conducting sphere in a uniform electric field.</p> <p><b>UNIT – III</b>            Dielectric constant, Polar and Non Polar dielectrics, Dielectrics and Gauss's Law, Dielectric Polarization, Electric Polarization vector P, Electric displacement vector D, Relation between three electric vectors, Dielectric susceptibility and permittivity, Polarizability and mechanism of Polarization, Lorentz local field, Clausius Mossotti equation, Debye equation. Ferroelectric and Paraelectric dielectrics, Steady current, current density J, non-steady currents and continuity equation, rise and decay of current in LR, CR and LCR circuits, decay constants, AC circuits, complex numbers and their applications in solving AC circuit problems, complex impedance and reactance, series and parallel resonance, Q factor, power consumed by an AC circuit, power factor.</p> <p><b>UNIT – IV</b>            Magnetization Current and magnetization vector M, three magnetic vectors and their relationship, magnetic permeability and susceptibility, Diamagnetic, paramagnetic and ferromagnetic substances. B.H. Curve, cycle of magnetization and hysteresis, Hysteresis loss. Biot-sevart's Law and its applications: B due to (1) a straight current carrying conductor and (2) current loop. Current loop as a magnetic dipole and its dipole moment (Analogy with electric dipole). Ampere's Circuital law (Integral and Differential forms).</p> <p><b>UNIT – V</b>            Electromagnetic Induction, Faraday's law, electromotive force, Integral and differential forms of Faraday's law, Mutual and self inductance. Transformers, energy in a static magnetic field. Maxwell's displacement current Maxwell's equations, electromagnetic field energy density. The wave equation satisfied by E and B, plane electromagnetic waves in vacuum, Poynting's vector.</p>	<p><b>12 Hours</b>  <b>(40 Min. x 18</b>  <b>Periods</b>  <b>Per Unit)</b>  <b>=</b>  <b>90 Days</b></p> <p><b>(From August 22 to February 23)</b></p>
	<b>Total Duration : 120 Hours</b>	<b>180</b> <b>Periods</b>

  
 Faculty

  
 HOD

  
 Co-ordinator  
 IQAC  
 Government College Gurur  
 Dist. Balod (C.G.)

  
 Principal  
 Government College Gurur  
 Dist. Balod (C.G.)



## Monthly Teaching Plan 2022 - 23

Program Name – B.Sc. (PCM)		Class – 01 <sup>st</sup> Year		Paper – 01 <sup>st</sup> (Mechanics, Oscillations and Properties of Matter) Paper – 02 <sup>nd</sup> (Electricity, Magnetism and Electromagnetic Theory)		
S N	Month	Curriculum Plan	No. of Periods	Teaching Method	Activity	Exam or Test
01	August 2022	<b>PAPER – I, UNIT – I</b> Cartesian, Cylindrical and Spherical coordinate system, Inertial and non-inertial frames of reference, uniformly rotating frame, Coriolis force and its applications. Motion under a central force, Kepler's law. Effect of Centrifugal and Coriolis forces due to earth's rotation, center of mass (CM), Lab and C.M. frame of reference, motion of CM of system of particles subject to external forces, elastic and inelastic collisions in one and two dimensions, Scattering angle in the laboratory frame of reference, Conservation of linear and angular momentum, Conservation of energy.	18	Chock & Talk PPT Chart	Poster Making, Student Seminar	Unit Test
		<b>PAPER – I, UNIT – I</b> Repeated Integrals of a function of more than one variable, definition of a double and triple integral. Gradient of a scalar field and its geometrical interpretation, divergence and curl of a vector field and their geometrical interpretation, line, surface and volume integrals, flux of a vector field, Gauss's divergence theorem, Green's theorem and Stoke's theorem. Constant – current Sources. Thevenin theorem, Norton theorem, Superposition theorem, Reciprocity theorem and Maximum Power Transfer theorem.	18			
02	September 2022	<b>PAPER – I, UNIT –II (09 Days)</b> Rigid body motion, rotational motion, moments of inertia and their products, principal moments and axes, Introductory idea of Euler's equations. Potential well and Periodic Oscillations, case of harmonic small oscillations, differential equation and its solution, kinetic and potential energy, examples of simple harmonic oscillations: spring and mass system, simple and compound pendulum, torsional pendulum.	18	Chock & Talk PPT Demonstration Remedial Class Revision Class	Poster Making, Student Seminar, Quiz Competition	Unit Test
		<b>PAPER – II, UNIT –II</b> Coulomb's law in vacuum expressed in vector forms, calculations of E for simple distributions of charges at rest, dipole and quadrupole fields. Work done on a charge in an electrostatic field expressed as a line integral, conservative nature of the electrostatic field. Relation between Electric potential and Electric field, torque on a dipole in a uniform electric field and its energy, flux of the electric field. Gauss's law and its application: E due to (1) an infinite line of charge, (2) a charged cylindrical conductor, (3) an infinite sheet of charge and two parallel charged sheets, capacitors, electrostatic field energy, force per unit area of the surface of a conductor in an electric field, conducting sphere in a uniform electric field.	18			







06	January 2023	<b>PAPER – I, UNIT – IV</b> E as an accelerating field, electron gun, case of discharge tube, linear accelerator, E as deflecting field, CRO sensitivity, Transverse B field, $108^\circ$ deflection, mass spectrograph, curvatures of tracks for energy determination, principle of a cyclotron, Mutually perpendicular E and B fields: velocity selector, its resolution, Parallel E and B fields, positive ray parabolas, discovery of isotopes, elements of mass spectrography, principle of magnetic focusing lens.	18	Chock & Talk PPT Chart Virtual Demonstration Remedial Class Revision Class	Poster Making, Student Seminar Quiz Competition	Pre Final Exam
07	February 2023	<b>PAPER – II, UNIT – V</b> Electromagnetic Induction, Faraday's law, electromotive force, Integral and differential forms of Faraday's law, Mutual and self inductance. Transformers, energy in a static magnetic field. Maxwell's displacement current Maxwell's equations, electromagnetic field energy density. The wave equation satisfied by E and B, plane electromagnetic waves in vacuum, Poynting's vector.	18	Chock & Talk PPT Chart Virtual Demonstration Remedial Class Revision Class	Poster Making, Student Seminar Group Discussion	-
<b>07 Months</b>		<b>Two Papers – 10 Units</b>	<b>180 Periods</b>			<b>07 Internal Exams</b>

  
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