

Government General Degree College, Chapra

Department of Physics (Sem-II)

Lesson Plan 2024-2025, Undergraduate Course in Physics (NEP-2020)

Semester	Tentative dates of University Exam	Name of the faculty	Course code	Allotted topic/text	Sub-topic/Lesson plan (No. Of Lecture)
Sem- II	Follow the latest notification by KU	Dr. Shaikh Safikul Alam (SSA)	PHY-M-T-2 (MECHANICS)	Fundamentals of Dynamics Work and Energy Collisions Rotational Dynamics	Reference frames. Inertial frames; Galilean transformations; Galilean invariance. Review of Newton's Laws of Motion. Dynamics of a system of particles. Centre of Mass. Principle of conservation of momentum. Impulse. Momentum of variable-mass system: motion of rocket. (6 Lectures) Work and Kinetic Energy Theorem. Conservative and non-conservative forces. Potential Energy. Energy diagram. Stable and unstable equilibrium. Elastic potential energy. Force as gradient of potential energy. Work & Potential energy. Work done by non-conservative forces. Law of conservation of Energy. (4 Lectures) Elastic and inelastic collisions between particles. Centre of Mass and Laboratory frames. (3 Lectures) Angular momentum of a particle and system of particles. Torque. Principle of conservation of angular momentum. Rotation about a fixed axis. Moment of Inertia. Calculation of moment of inertia for rectangular, cylindrical and spherical bodies. Kinetic energy of rotation. Motion involving both translation and rotation. (12 Lectures)
			PHY-M-P-2 (MECHANICS)		1. Measurements of length (or diameter) using vernier caliper, screw gauge and travelling microscope. 2. To study the random error in observations. 3. To determine the height of a building using a Sextant. 4. To study the Motion of Spring and calculate (a) Spring constant, (b) g
			PHY-MI-T-2 (MECHANICS)	Laws of Motion Momentum and Energy	Frames of reference. Newton's Laws of motion. Dynamics of a system of particles. Centre of Mass. (4 Lectures) Conservation of momentum. Work and energy. Conservation of energy. Motion of rockets. (3 Lectures)

				Rotational Motion	Angular velocity and angular momentum. Torque. Conservation of angular momentum. Moment of Inertia. Calculation of moment of inertia for rectangular, cylindrical and spherical bodies. (6 Lectures)
				Non-Inertial Systems	Non-inertial frames and fictitious forces. Uniformly rotating frame. Laws of Physics in rotating coordinate systems. Centrifugal force. Coriolis force and its applications. (3 Lectures)
			PHY-MI-P-2 (MECHANICS)		1. Measurements of length (or diameter) using vernier caliper, screw gauge and travelling microscope. 2. To study the random error in observations. 3. To determine the height of a building using a Sextant. 4. To study the Motion of Spring and calculate (a) Spring constant, (b) g
			PHY-SEC-T-2 (Basic Instrumentation Skills)	Basic of Measurement Electronic Voltmeter Signal Generators and Analysis Instruments	Instruments accuracy, precision, sensitivity, resolution range etc. Errors in measurements and loading effects. Multimeter: Principles of measurement of dc voltage and dc current, ac voltage, ac current and resistance. Specifications of a multimeter and their significance. (6 Lectures) Advantage over conventional multimeter for voltage measurement with respect to input impedance and sensitivity. Principles of voltage measurement (block diagram only). Specifications of an electronic Voltmeter/ Multimeter and their significance. AC millivoltmeter: Type of AC millivoltmeters: Amplifier- rectifier, and rectifier- amplifier. Block diagram ac millivoltmeter, specifications and their significance. (6 Lectures) Block diagram, explanation and specifications of low frequency signal generators. pulse generator, and function generator. Brief idea for testing, specifications. Distortion factor meter, wave analysis. (5 Lectures)
		Sudipta Das (SD)	PHY-M-T-2 (MECHANICS)	Elasticity Fluid Motion Gravitation and Central Force Motion Motion of a particle under	Relation between Elastic constants. Twisting torque on a Cylinder or Wire. (3 Lectures) Kinematics of Moving Fluids: Poiseuille's Equation for Flow of a Liquid through a Capillary Tube. Euler's Equation. Bernoulli's Theorem. (2 Lectures) Law of gravitation. Gravitational potential energy. Inertial and gravitational mass. Potential and field due to spherical shell and solid sphere. (3 Lectures) Two-body problem and its reduction to one-body problem and its solution. The energy equation and energy diagram. Kepler's Laws. Satellite in circular orbit and applications.

				a central force field Oscillations	Geosynchronous orbits. Weightlessness. Basic idea of global positioning system (GPS). Physiological effects on astronauts. (6 Lectures) SHM: Simple Harmonic Oscillations. Differential equation of SHM and its solution. Kinetic energy, potential energy, total energy and their time-average values. Damped oscillation. Forced oscillations: Transient and steady states; Resonance, sharpness of resonance; power dissipation and Quality Factor. (7 Lectures)
			PHY-M-P-2 (MECHANICS)		5. To determine the Moment of Inertia of a Flywheel/ a rigid body. 6. To determine g and velocity for a freely falling body using Digital Timing Technique 7. To determine Coefficient of Viscosity of water by Capillary Flow Method (Poiseuille's method). 8. To determine the Young's Modulus of the material of a bar by flexure method
			PHY-MI-T-2 (MECHANICS)	Gravitation Collisions Oscillations	Newton's Law of Gravitation. Motion of a particle in a central force field (motion is in a plane, angular momentum is conserved, areal velocity is constant). Kepler's Laws (statement only). Satellite in circular orbit and applications. Geosynchronous orbits. Basic idea of global positioning system (GPS). Weightlessness. Physiological effects on astronauts. (6 Lectures) Elastic and inelastic collisions between particles. Centre of Mass and Laboratory frames. (3 Lectures) Simple harmonic motion. Differential equation of SHM and its solutions. Kinetic and Potential Energy, Total Energy and their time averages. Damped oscillation. (4 Lectures)
			PHY-MI-P-2 (MECHANICS)		5. To determine the Moment of Inertia of a Flywheel/ a rigid body. 6. To determine g and velocity for a freely falling body using Digital Timing Technique 7. To determine Coefficient of Viscosity of water by Capillary Flow Method (Poiseuille's method). 8. To determine the Young's Modulus of the material of a bar by flexure method
			PHY-SEC-T-2 (Basic Instrumentation Skills)	Cathode Ray Oscilloscope	Block diagram of basic CRO. Construction of CRT, Electron gun, electrostatic focusing and acceleration (Explanation only- no mathematical treatment), brief discussion on screen phosphor, visual persistence & chemical composition. Time base operation, synchronization. Front panel controls. Specifications of a CRO and their significance. (9 Lectures) Use of CRO for the measurement of voltage (dc and ac frequency, time period. Special features of dual trace, introduction to digital oscilloscope, probes. Digital storage Oscilloscope: Block diagram and principle of working. (5 Lectures)

Dr. Supriya Mandal (SM)	PHY-M-T-2 (MECHANICS)	Non-Inertial Systems Special Theory of Relativity	Non-inertial frames and fictitious forces. Uniformly rotating frame. Laws of Physics in rotating coordinate systems. Centrifugal force. Coriolis force and its applications. Components of Velocity and Acceleration in Cylindrical and Spherical Coordinate Systems. (4 Lectures) Michelson-Morley Experiment and its outcome. Postulates of Special Theory of Relativity. Lorentz Transformations. Simultaneity and order of events. Lorentz contraction. Time dilation. Relativistic transformation of velocity, frequency and wave number. Relativistic addition of velocities. Variation of mass with velocity. Massless Particles. Mass-energy Equivalence. Relativistic Doppler effect. Relativistic Kinematics. Transformation of Energy and Momentum. Four Vectors (definition and examples only). (10 Lectures)
	PHY-M-P-2 (MECHANICS)		9. To determine the Modulus of Rigidity of a Wire by - Dynamic Method. 10. To determine the elastic Constants of a wire by Searle's method. 11. To determine the value of g using Bar Pendulum. 12. To determine the value of g using Kater's Pendulum. 13. To draw the frequency - resonance length curve of a sonometer wire and to determine an unknown frequency of a tuning fork 14. Measurement of coefficient of viscosity by Stoke's method.
	PHY-MI-T-2 (MECHANICS)	Elasticity Fluid Motion Special Theory of Relativity	Hooke's law - Stress-strain diagram - Elastic moduli-Relation between elastic constants - Poisson's Ratio-Expression for Poisson's ratio in terms of elastic constants - Work done in stretching and work done in twisting a wire - Twisting couple on a cylinder - Determination of Rigidity modulus by static torsion – Torsional pendulum-Determination of Rigidity modulus and moment of inertia-γ, η and σ by Searle's method. (5 Lectures) Kinematics of Moving Fluids: Poiseuille's Equation for Flow of a Liquid through a Capillary Tube. Euler's Equation. Bernoulli's Theorem. (3 Lectures) Michelson-Morley Experiment and its outcome. Postulates of Special Theory of Relativity. Lorentz Transformations. Simultaneity and order of events. Length contraction. Time dilation. Relativistic transformation of velocity, Relativistic addition of velocities. Variation of mass with velocity. Massless Particles. Mass-energy Equivalence. Relativistic Doppler effect. (8 Lectures)

			PHY-MI-P-2 (MECHANICS)		9. To determine the Modulus of Rigidity of a Wire by - Dynamic Method. 10. To determine the elastic Constants of a wire by Searle's method. 11. To determine the value of g using Bar Pendulum. 12. To determine the value of g using Kater's Pendulum. 13. To draw the frequency - resonance length curve of a sonometer wire and to determine an unknown frequency of a tuning fork 14. Measurement of coefficient of viscosity by Stoke's method.
			PHY-SEC-T-2 (Basic Instrumentation Skills)	Impedance Bridges & Q-Meters Digital Instruments Digital Multimeter	Block diagram of bridge. working principles of basic (balancing type) RLC bridge. Specifications of RLC bridge. Block diagram & working principles of a Q- Meter. Digital LCRbridges. (5 Lectures) Principle and working of digital meters. Comparison of analog& digital instruments. Characteristics of a digital meter. Working principles of digital voltmeter. (4 Lectures) Block diagram and working of a digital multimeter. Working principle of time interval, frequency and period measurement using universal counter/ frequency counter, time-base stability, accuracy and resolution. (5 Lectures)