Academic Year 2022-23 Name of Department: PHYSICS Name of Teacher: Mr. Rohit Kumar Seth Class: B.Sc. Part One Paper: First Course Type: Theory Course Code/Title: 0793/Mechanics. Oscillations and properties of matter

Month	Unit	Topic of lecture	Numbe	Methods/Mode of delivery
WOItti	Unit	Topic of lecture	rof	Wethous/Wode of delivery
			lectures	
August	Unit I	Cartesian, cylindrical and	11	1. Chalk & Duster
		spherical coordinate system,		method
		Inertial and non-inertial frames		2. Assignment
		of reference, uniformly rotating		3. E-learning
		frame, Coriolis force and its		4. Group Discussion
		applications. Motion under a		5. Flip the class
		central force, Kepler's law.		6. Visual method
		Effect of Centrifugal and		
		Coriolis forces due to earth's		
		rotation		
September	Unit I &	Center of mass (C M) Lab and	22	1 Chalk & Duster
September	Unit II	C M frame of reference motion		method
	Om n	c.M af a system of particles		2 Assignment
		of C.W. of system of particles		2. Assignment
		subject to external forces, elastic		5. E-learning
		and inelastic collisions in one		4. Group Discussion
		and two dimensions, Scattering		5. Flip the class
		angle in the laboratory frame of		6. Visual method.
		reference, Conservation of linear		
		and angular momentum,		
		Conservation of energy Rigid		
		body motion, rotational motion,		
		moment of inertia and their		
		products, Principal moment and		
		axes. Introductory idea of		
		Euler's equations.		
October	Unit II&	Potential well and Periodic	18	1. Chalk & Duster
	Unit III	oscillations Case of harmonic		method
		small oscillations differential		2 Assignment
		equation and its solution Kinetic		3 F-learning
		and notential energy examples		A Group Discussion
		of simple harmonic oscillations:		5 Elip the class
		arring and mass system simple		5. Flip the class
		spring and mass system, simple		o. Visual method.

		and compound pendulum, torsional pendulum, Bifilar Oscillations, Helmholtz resonator, LC circuit ,vibrations of a magnet, oscillations of two masses connected by a spring. Superposition of two simple harmonic motions of same frequency, Lissajous figures, damped harmonic oscillator, case of different frequencies. Power dissipation, quality factor, examples.		
November	Unit II & Unit IV	Driven (forced) harmonic oscillator, transient and steady states, power absorption resonance Electric field as an accelerating field, electron gun, case of discharge tube, linear accelerator, E as deflecting field, CRO sensitivity, Transverse B field, 180° deflection, mass spectrograph, curvatures of tracks of energy determination, principle of a cyclotron. Mutually perpendicular E and B fields: velocity selector, its resolution.	20	 Chalk & Duster method Assignment E-learning Group Discussion Flip the class Visual method.
December	Unit IV& V	Parallel E and B fields, positive ray parabolas, discovery of isotope, elements of mass spectrography, principle of magnetic focusing lens, 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.	20	 Chalk & Duster method Assignment E-learning Group Discussion Flip the class Visual method.

January	Unit V	Viscosity: Poiseulle's equation	12	1. Chalk & Duster
		of liquid flow through a narrow		method
		tube, equations of continuity.		2. Assignment
		Euler's equation, Bernoulli's		3. E-learning
		theorem, viscous fluids,		4. Group Discussion
		streamline and turbulent flow.		5. Flip the class
		Poiseulle's law, coefficient of		6. Visual method.
		viscosity, Stoke's law, Surface		
		tension and molecular		
		interpretation of surface tension,		
		Surface energy, Angle of		
		contact, wetting.		

Academic Year 2022-23 Name of Department: PHYSICS Name of Teacher: Mr. Rohit Kumar Seth Class: B.Sc. Part One Paper: Second Course Type: Theory Course Code/Title: 0793/Electricity, Magnetism and Electromagnetic waves

Month	Unit	Topic of lecture	Number	Methods/Mode of
			of	delivery
			lectures	
August	Unit I	Repeated integrals of a function of	11	1. Chalk & Duster
		more than one variable, definition of a		method
		double and triple integration. Gradient		2. Assignment
		of a scalar field and its geometrical		3. E-learning
		interpretation, divergence and curl of a		4. Group
		vector field, and their geometrical		Discussion
		interpretation, line, surface and volume		5. Flip the class
		integrals, flux of a vector field. Gauss's		6. Visual method.
		divergence theorem, Green's theorem		
		and Stoke's theorem and their physical		
		significance.		
September	Unit	Kirchoff's law, Ideal Constant-voltage	22	1. Chalk & Duster
1	I/	and Ideal Constant-Current sources.		method
	Unit	Thevenin theorem, Norton theorem,		2. Assignment
	II	Superposition theorem, Reciprocity		3. E-learning
		theorem and Maximum power transfer		4. Group
		theorem. Coulomb's law vacuum		Discussion
		expressed in vector forms, calculation		5. Flip the class
		of E for simple distribution of charge at		6. Visual method.
		rest, dipole and quadrupole fields.		
		Work done on a charge in a		
		electrostatic field expressed as a line		
		integral, conservative nature of the		
		electrostatic field. Relation between		
		electric potential and electric field,		
		torque on dipole in 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			
	TT •	charged sheets.	10		
October	Unit	capacitors, electrostatic field energy,	18	1.	Chalk & Duster
		force per unit area of the surface of a		-	method
	Unit	conductor in an electric field,		2.	Assignment
	III	conducting sphere in a uniform electric		3.	E-learning
		field. Dielectric constant, polar and		4.	Group
		non-polar dielectrics, dielectrics and		_	Discussion
		Gauss's law, Dielectric polarization,		5.	Flip the class
		Electric polarization vector P, Electric		6.	Visual method.
		displacement vector D. Relation			
		between three electric vectors,			
		Dielectric susceptibility and			
		permittivity, Polarizability and			
		mechanics of Polarization, Lorentz			
		local field, Clausius-mossotti equation,			
		Debye equation.			
November	Unit	Ferroelectric and para-electric,	20	1.	Chalk & Duster
	III/	dielectrics, Steady current, current			method
	Unit	density J, non- steady current and		2.	Assignment
	IV	continuity equation, rise and decay of		3.	E-learning
		current in LR, CR and LCR circuits,		4.	Group
		decay constants, AC circuits, complex			Discussion
		numbers and their applications in		5.	Flip the class
		solving AC problems, complex		6.	Visual method.
		impedence and reactance, series and			
		parallel resonance, Q factor, power			
		consumed by an a AC circuit, power			
		factor. Magnetization current and			
		magnetization vector M, three magnetic			
		vectors and their relationship, Magnetic			
		permeability and susceptibility.			
December	Unit	Diamagnetic, paramagnetic and	20	1.	Chalk & Duster
	IV/	ferromagnetic substances. BH curve,			method
	Unit	cycle of magnetization and hysteresis,		2.	Assignment
	V	Hysteresis loss. Biot-Savart's law and		3.	E-learning
		its application : B due to (1) a straight		4.	Group
		current carrying conductor and (2)			Discussion
		Current loop. Current loop as a		5.	Flip the class
		magnetic dipole and its Dipole		6.	Visual method.
		Moment(Analogy with electric dipole).			
		Ampere's circuital law(Integral and			
		Differential forms). 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.			
January	Unit	Electromagnetic induction, Faraday's	12	1.	Chalk & Duster
	V	law, electromotive force, integral and			method
		differential forms of Faraday's law,		2.	Assignment
		Mutual and self inductance,		3.	E-learning
		Transformers, energy in a static		4.	Group
		magnetic field. Maxwell's			Discussion
		displacement current, Maxwell's		5.	Flip the class
		equations, electromagnetic field		6.	Visual method.
		energy density. The wave equation			
		satisfied by B and E, plane			
		electromagnetic waves in vacuum,			
		Poynting's vector			

Academic Year 2022-23

Name of Department: PHYSICS

Name of Teacher: Mr. Rohit Kumar Seth

Class: B.Sc. Part Two

Paper: First

Course Type: Theory Course

Code/Title: 0793/Thermodynamics, Kinetic theory and Statistical Physics

Month	Unit	Topic of lecture	Number	Methods/Mode of
			of	delivery
			lectures	
August	Unit I	The laws of Thermodynamics: The	11	1. Chalk & Duster
		Zeroth law, First law of		method
		thermodynamics, Internal energy as a		2. Assignment
		state function, reversible and		3. E-learning
		irreversible change, Carnot's cycle,		4. Group Discussion
		Carnot's theorem, second law of		5. Flip the class
		thermodynamics. Clausius theorem		6. Visual method.
		inequality. Entropy, change of		
		entropy of the universe. Entropy		
		change in reversible and irreversible		
		processes, entropy of ideal gas,		
		entropy as a thermodynamic variable,		
		S-T diagram, principle of increase of		
		entropy.		
September	Unit I/	The thermodynamic scale of	22	1. Chalk & Duster
	Unit II	temperature, third law of		method
		thermodynamics, concept of negative		2. Assignment
		temperature. Thermodynamic		3. E-learning
		function, internal energy, enthalpy,		4. Group Discussion
		Helmholtz function and Gibb's free		5. Flip the class
		energy, Maxwell's thermodynamical		6. Visual method.
		equations and their applications, TdS		
		equations, energy and heat capacity		
		equation, application of Maxwell's		
		equation in Joule-Thomson cooling		
		,adiabatic cooling of a system,		
		Vander-Waals gas ,Clausius-		
		Clapeyron heat equation. Black body		

			1	
		spectrum, Stefan-Boltzmann law,		
		Wien's displacement law, Rayleigh-		
		Jean's law, Planck's quantum theory		
	TT '4 TTT		10	
October	Unit III	Maxwellian distribution of speeds in	18	1. Chalk & Duster
		an Ideal gas: distribution of speeds		
		and velocities, experimental		2. Assignment
		mean rms and most probable speed		5. E-learning
		value. Deppler's breadening of		5 Elip the class
		spectral lines. Transport phenomenon		5. Flip the class 6. Visual method
		in gases: molecular collisions, mean		0. Visual method.
		free path and collision cross sections		
		Estimate of molecular diameter and		
		mean free path Transport of mass		
		momentum and energy and		
		interrelationship dependence on		
		temperature and pressure		
November	Unit	Behavior of real gases: deviations	20	1. Chalk & Duster
	III/	from the ideal gas equation. The	_ •	method
	Unit IV	Virial equation. Andrews		2. Assignment
		experiments on carbon-di-oxide gas.		3. E-learning
		Critical constants. The statistical		4. Group Discussion
		basics of thermodynamics:		5. Flip the class
		Probability and thermodynamics		6. Visual method.
		probability, principle of equal a		
		priori probabilities, statistical		
		postulates. Concept of Gibb's		
		ensemble, accessible and		
		inaccessible states. Concept of Phase		
		space, γ -phase space and μ - phase		
		space. Equilibrium before two		
		systems in thermal contact,		
		probability and entropy, Boltzmann		
		entropy relation.		
December	Unit	Boltzmann canonical distribution law	20	1. Chalk & Duster
	IV/	and its applications, laws of		method
	Unit V	equipartition of energy. Transition		2. Assignment
		two quantum statistics: 'h' as a		3. E-learning
		natural constant and its implications,		4. Group Discussion
		cases of particle in one dimensional		5. Flip the class
		box and one dimensional harmonic		6. Visual method.
		oscillator. Indistinguisnability of		
		Finatoin and Formi Direct conditions		
		concept of partition function		
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January	Unit V	Derivation of Maxwell-Boltzmann,	12	1.	Chalk & Duster
		Bose-Einstein and Fermi- Dirac			method
		statistics, Limit of Maxwell-		2.	Assignment
		Boltzmann, Bose-Einstein and		3.	E-learning
		Fermi- Dirac statistics. Application		4.	Group Discussion
		of B-E statistics to Black body		5.	Flip the class
		radiation, application of F-D		6.	Visual method.
		statistics to free electron in a metal.			

Academic Year 2022-23 Name of Department: PHYSICS Name of Teacher: Mr. Rohit Kumar Seth Class: B.Sc. Part One Course Type: Practical Course

Month	Name of Experiment
September	1. Determination of the value of gravitational constant 'g' using Bar pendulum.
	 Verification of law of perpendicular axes theorem related to moment of inertia.
	3. Determination of modulus of rigidity of a wire using Maxwell's needle.
	 Determination of modulus of rigidity of given a wire using Torsional pendulum.
October	${f 1}_{f \cdot}$ To study bending of a Cantilever.
	 Determination of surface tension of water using Jaeger's apparatus.
	3. Determination of Young's modulus of a wire using Searl's apparatus.
	4. Determination of moment of inertia of Fly-Wheel.
November	${f 1.}$ Verification of Hook's law and determination of spring constant.
	2. To study motion of a simple pendulum.
	3. Verification of Ohm's law.
	 To study the intensity of magnetic field due to a current carrying circular coil.
December	${f 1}_{f \cdot}$ Measurement of low resistance using the Carey-Foster's bridge.
	2. Study of rise and decay of current in RC/LR circuit.
	3. C-Program to find addition of two numbers.
	4. C-Program to find the product of two numbers.
January	1. Revision

Academic Year 2022-23 Name of Department: PHYSICS Name of Teacher: Mr. Rohit Kumar Seth Class: B.Sc. Part Two Course Type: Practical Course

Month	Name of Experiment
September	 To find refractive index of material of given prism using spectrometer. To find dispersion power of material of prism using spectrometer.
	3. Study of diffraction of light through grating.
October	 To find the wavelength of monochromatic light by Newton's ring method. Determination of Stefan's constant. Study of divergence of LASER beam.
November	 Determination of Joule's constant. Study of standing constant. Determination of heat conductivity of a material by Lee's disc method. Verification of laws of transverse vibration in stretched string using sonometer.
December	 C-Program to arrange numbers in decreasing order. C-Program to arrange numbers in increasing order. C-Program to check even or odd numbers. C-Program to check positive or negative numbers.
January	 To find wavelength of white light (for yellow color) using grating. Revision