

Department of Physics

Teaching Plan 2024-25

B.Sc- I

Course Teacher: Prof. M. S. Bhosale
Course Title: DSC Mechanics I (Sem-I)

Month	Theory Component	Practical CIE Component
July	Admission process	
August	Module I : Unit I - Vector: Scalar and vector product, Derivatives of a vector with respect to parameter (velocity & acceleration). Unit II - A) Ordinary Differential Equation: Differential Equation- Ordinary & partial differential equation, 1st order homogeneous differential equation, 2nd order homogeneous differential equation with constant coefficients.	GROUP A - 1) Measurements of length using vernier calliper, screw gauge and travelling microscope. 2) Moment of Inertia of a disc using auxiliary ring. 3) Moment of Inertia of a flywheel. 4) Determine g by Bar pendulum.
September	B) Laws of motion: Introduction, frame of reference, Inertial & Non-inertial frame of reference, Newton's laws of motion and their proof. Module II : Unit I - Rotational motion: Introduction, Angular velocity, angular momentum, angular displacement, angular acceleration and torque, System of particle- Centre of mass, Moment of Inertia (in short).	5) Determine g by Kater's pendulum. 6) Study exponential decay of amplitude of simple pendulum 7) To study the motion of a spring and calculate a) Spring Constant b) value of g. GROUP B – 1) Testing of component. 2) To use a Multimeter for measuring a)Resistance b)AC and DC voltage c)DC current d) Checking electrical fuses.
October	Unit II - Dynamics of a system of particles: Conservation of linear and angular momentum, work and energy theorem, conservation of energy (single particle), Dynamics of system of	3) Thevenin /Norton theorem. 4) Measurement of constant of B.G.

	particles (linear momentum, angular momentum and energy), Centre of mass.	5) Compare capacitance using De'Sauty's bridge (B.G./ Spot galvanometer) 6) High resistance by Leakage Method.
November	Exam Related Work	
	Course Title: DSC Mechanics II (Sem-II)	
December	Module I : Unit I - Gravitation : Newton's law of Gravitation, Motion of particle in central force field, Satellite in a circular orbit, Geosynchronous orbits, Basic idea of GPS.	GROUP A - 1) Surface Tension by Jaeger's method. 2) Young's modulus of a material of Bar by vibration. 3) Modulus of rigidity of material of wire by torsional oscillation.
January	Unit II - Oscillations : SHM, types of oscillation, differential equation of SHM, Energy of SHM, solution for equation of SHM, Compound pendulum, Kater's pendulum, Bessel's formula, bifilar pendulum. Module II : Unit I – Elasticity : Bending of beam, bending moment, cantilever (without considering weight of cantilever), beam supported at both ends (without considering weight of beam).	4) Poission's ratio for using rubber tube. 5) Y/η of wire by Searle's method. 6) To level the prism table using spirit level & optical method & hence determine angle of prism using spectrometer. GROUP B - 1) Impedance of series LCR. 2) Series LCR circuit and determine it's a) Resonant Frequency b) Quality factor Q.
February	Unit II - Surface Tension : Surface tension, angle of contact and wettability, relation between surface tension, excess of pressure and radius of curvature,	3) Parallel LCR circuit and determine it's a) Anti-resonant Frequency

	experimental determination by Jaegers method, Applications of Surface tension.	b) Quality factor Q. 4) Frequency of A.C.mains by Sonometer. 5) Determine low resistance by Carey Foster's bridge. 6) Measurement of field strength B and its variation in a Solenoid (determine dB/dx).
March	Practical Exam Related Work	
April	Theory Exam Related Work	

Department of Physics

Teaching Plan 2024-25

B.Sc- II

Course Teacher: Prof. M. S. Bhosale

Course Title: DSC Thermal & Statistical Mechanics I (Sem-III)

Month	Theory Component	Practical CIE Component
July	Admission process	
August	Module I : Unit I - Kinetic Theory of Gases : Mean free path, derivation of Maxwell's law of distribution of velocities and its experimental verification, Transport Phenomena: transport of momentum (viscosity), transport of thermal energy (conduction), Law of equipartition of energy (qualitative) and its applications to specific heat of monoatomic and diatomic gases. Unit II - Thermometry : Principle of thermometry, types of thermometers, Scales of temperature (Celsius, Kelvin, Fahrenheit and Rankine) , Mercury thermometer, Thermoelectric thermometer, Platinum resistance thermometer , Thermister.	
September	Module II : Unit I - Thermodynamics I : Thermodynamic system, thermodynamic variables, equation of state, thermodynamic equilibrium, Zeroth Law of thermodynamics, Internal energy, First law of thermodynamics, conversion of heat into work, specific heats C_P & C_V , Applications of First Law (Isothermal process, Adiabatic process, Isochoric process, Isobaric process), relation between C_P & C_V , work done during isothermal and adiabatic processes, reversible & irreversible processes.	
October	Unit II - Thermodynamics II : Second law of thermodynamics, Carnot's ideal heat engine, Carnot's cycle (Working & efficiency), Carnot's theorem, Entropy	

	(concept & significance), Entropy changes in reversible & irreversible processes, Third law of thermodynamics, Unattainability of absolute zero.	
November	Exam Related Work	
	Course Title: DSC Thermal & Statistical Mechanics II (Sem-IV)	
December	<p>Module I : Unit I - Thermodynamic Potentials : Enthalpy, Gibbs, Helmholtz, Internal Energy functions, Maxwell's thermodynamical relations, Joule-Thomson effect, Clausius-Clapeyron equation, Expression for $(C_P - C_V)$, C_P/C_V, TdS equations.</p> <p>Unit II - Theory of Radiation : Blackbody radiation and its importance, Experimental study of black body radiation spectrum, Concept of energy density, Derivation of Planck's law, Deduction of Wien's distribution law, Rayleigh-Jeans Law, Stefan Boltzmann Law and Wien's displacement law from Planck's law.</p>	
January	<p>Unit I - Classical statistics : Position space, Momentum space, Phase space, Microstate and Macrostate, Accessible microstates, priory probability, thermodynamic probability, probability distribution, Maxwell-Boltzmann distribution law, Evaluation of constants α and β, Entropy and Thermodynamic probability, Distribution of molecular speeds.</p>	
February	<p>Unit II - Quantum statistics : Bose-Einstein distribution law, photon gas, Fermi-Dirac distribution law, electron gas, comparison of M.B., B.E. and F.D. statistics.</p>	
March	Practical Exam Related Work	