**MSU/ 2020 -21/ UG-Colleges / Part-III (B.Sc. Physics) / Semester – I**

**Core - 1**

**PROPERTIES OF MATTER & MECHANICS**

**UNIT-I: ELASTICITY**

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 - experimental determination of poisson’s ratio of rubber - Twisting couple on a cylinder -Work done in twisting a wire - Torsional pendulum- Determination of Rigidity modulus and moment of inertia - q, n and σ by Searles method -I - section griders

**UNIT-II: BENDING OF BEAMS**

Bending of beams - Expression for bending moment - Cantilever - Expression for cantilever depression and oscillations - theory and experiments. Uniform bending and Non-uniform bending - theory and experiments.

**UNIT-III: FLUIDS**

Surface Tension - Synclastic and anticlastic surfaces - Excess of pressure - application to spherical and cylindrical drops and bubbles - variation of surface tension with temperature - Jaegar’s method. Capillary rise - Experimental determination of surface tension by capillary rise - angle of contact of mercury-Quincke’s method. Viscosity - Rate flow of liquid in a capillary tube - Poiseuille’s formula - Determination of coefficient of viscosity by capillary flow - Variations of viscosity of a liquid with temperature- lubricants.

**UNIT-IV: DYNAMICS OF RIGID BODIES**

Translational and rotational motion - Angular momentum and angular impulse - moment of inertia and radius of gyration - - Compound pendulum - theory - equivalent simple pendulum - reversibility of centres of oscillation and suspension - determination of g and k -Newton’s second law for rotation – torque, work, rotational kinetic energy and expression for power during rotation - Kinetic energy of rolling - Acceleration of a uniform body, rolling down an inclined plane. Precessional motion -

**UNIT-V: HYDROSTATICS AND HYDRODYNAMICS**

Pressure and thrust - Thrust on a plane surface immersed in a liquid - centre of pressure - centre of pressure on a rectangular lamina, a triangular lamina. Laws of floation - determination of meta centric height of a ship - steady and streamline flow - equation of continuity - energy of a fluid - Bernoulli’s theorem – proof - pitot’s tube and venturimeter

**Books for study**

1. Properties of matter - Murugeshan R, S Chand & Co. Pvt. Ltd., New Delhi
2. Mechanics - D.S. Mathur - S Chand & Co
3. Mechanics and mathematical physics - R.Murugeshan -S Chand & Co. Pvt. Ltd., New Delhi.

**Books for Reference**

1. Elements of Properties of Matter - Mathur D S, Shyamlal Charitable Trust, New Delhi, 1993

2. Fundamentals of General Properties of Matter - Gulati H R, R Chand & Co. New Delhi, 1982

3. Fundamentals of Physics, - D Halliday, R Resnick and J Walker, Wiley NY 2001. 6th Edition

4. Mechanics – Berkely Physics course: Charles Kittel-Tata Mc Graw Hill Publication

**MSU/ 2020 -21/ UG-Colleges / Part-III (B.Sc. Physics) / Semester – II**

**Core - 2**

**OPTICS AND THERMAL PHYSICS**

**UNIT-I: GEOMETRICAL OPTICS**

Introduction - chromatic and spherical aberration in lenses and their removal - Dispersion of light - Refraction through a thin prism - Dispersive power of a prism - deviation without dispersion - dispersion without deviation - constant deviation spectroscope. Eyepieces - Huygen , Ramsden and Gauss eyepieces

**UNIT-II: INTERFERENCE**

Analytical treatment of interference - theory of interference fringes - interference in thin films due to reflected light - Air wedge - experiment to find thickness of a wire - Testing the plainness of surfaces – newton’s rings-theory and experiment- Michaelson’s interferometer and applications.

**UNIT-III: DIFFRACTION & POLARISATION**

Fresnel and FraunhoferDiffraction – comparison between Fresnel and fraunhofer diffraction - Diffraction by single slit - Diffraction by circular aperture - plane transmission grating- diffraction at normal and oblique incidence

Double refraction - Nicol Prism as polarizer and analyser - production and detection of plane, elliptically and circularly polarized light - Quarter and half wave plates - optical activity - Fresnel’s theory of optical activity.

**UNIT-IV: LOW TEMPERATURE PHYSICS**

Joule - Kelvin effect - liquefaction of hydrogen - liquefaction of helium-Kammerling - Onne’s method - Helium I and II - Lambda point - production of low temperatures - adiabatic demagnetization - practical applications of low temperature - refrigerators and air-conditioning machines - super fluidity - application of super fluidity.

**UNIT-V: THERMODYNAMICS**

Zeroth law, I and II law of thermodynamics - isothermal process-adiabatic process-gas equation during adiabatic process - work done during adiabatic and isothermal process - Carnot’s theorem - significance - thermodynamic scale of temperature - perfect gas scale of temperature - Carnot’s engine - Otto engine and Diesel engine - working and efficiency.

**Books for Study**

1. Heat and thermodynamics - Brijlal and Subramaniyam, S Chand & Co.

2.Thermal Physics - R Murugeshan and KiruthigaSivaprasad, S Chand & Co., New Delhi.

3. Optics by Subramaniam N & Brij Lal, S Chand & Co. Pvt. Ltd., New Delhi, 1990

**Books for Reference**

1. Heat and thermodynamics - D S Mathur, S Chand & Co., New Delhi

2. Introduction to Solid State Physics - C Kittel, Prentice Hall of India

3. Thermal Physics – S C Garg, R M Bansal and C K Ghosh, Tata McGraw-Hill 6.. Heat and thermodynamics - J B Rajam, S Chand & Co., New Delhi

4. Fundamentals of Optics by Jenkins A Francis and White E Harvey, McGRaw Hill Inc., New Delhi, 1976.

5. Fundamentals of Physics, 6th Edition, by D Halliday, R Resnick and J Walker. Wiley NY 2001.