

B.SC. PHYSICS
SEMESTER – III
CORE III - PROPERTIES OF MATTER AND SOUND

UNIT I:

Elasticity:

Three types of elastic moduli – Poisson's ratio – Bending of beams– Expression for bending moment –Cantilever–Depression of the loaded end of a Cantilever

Expression for Young's modulus (uniform and non-uniform bending) – experimental determination of Young's modulus using pin and microscope method (uniform and non-uniform bending) – Determination of Young's modulus by Koenig's method for non-uniform bending

Torsion of a body – expression for couple per unit twist – determination of rigidity modulus – Static torsion method with scale and telescope – determination of rigidity modulus by torsion pendulum with mass

UNIT II:

Viscosity:

Definition of Coefficient of viscosity with unit and dimension – expression for critical velocity– Poiseulli's formula for coefficient of viscosity and its correction – determination of coefficient of viscosity by capillary flow method (Poiseulli's method) – comparison of viscosities by Oswald's viscometer – viscosity of a highly viscous liquid –Stoke's formula–Stoke's method for the Coefficient of a highly viscous liquid

Diffusion:

Definition– Graham's laws of diffusion in liquids–Fick's laws of diffusion–Analogy with heat conduction– experimental determination of coefficient of diffusion (Diffusivity)–Graham's law of diffusion of gases–Effusion–transpiration

UNIT III:

Surface tension:

Definition of surface tension with unit and dimension– Surface energy – formation of drops– angle of contact – excess of pressure inside curved surface – Experimental determination of surface tension (Jaegar's method) – drop weight method of determining surface tension and interfacial surface tension –Quincke's method

Osmosis: Definition– experimental determination of osmotic pressure – Laws of osmosis– osmotic pressure and vapour pressure of a solution.

UNIT IV

Sound:

Equation of motion for a body executing angular simple harmonic oscillations—Definition of free, damped and forced vibrations – Theory of forced vibrations – Resonance – Sharpness of resonance – Fourier's theorem – application for Saw– tooth wave and square wave. –Sonometer – determination of A.C. frequency using sonometer

UNIT V

Ultrasonics:

Ultrasonics– Production –Piezo electric method –magnetostriction method – detection – properties – applications. Acoustics: Acoustics of buildings – reverberation time – derivation of Sabine's formula – determination of absorption coefficient.

BOOKS FOR STUDY:

1. D.S. Mathur, Elements of properties of matter, S.Chand & Company Ltd., New Delhi (2010).
2. R. Murugesan, Properties of matter and acoustics, S. Chand & Co, New Delhi (2012)
3. Brijlal and N. Subramanyam, Properties of matter, Eurasia Publishing House Limited (2005)
4. N. Subramaniam and Brijlal, AText Book of Sound, Vikas Publication House Pvt Ltd, New Delhi (1999)

BOOKS FOR REFERENCE:

1. Richard P.Feynman, Lectures on Physics. Vol. I & II, The New Millennium Edition (2012)
2. David Halliday and Robert Resnick, Fundamentals of Physics, Wiley Plus, (2013)
3. B.H. Flowers and E. Mendoza, Properties of matter, Wiley Plus, 1991.
4. H.R. Gulati, Fundamentals of General properties of matter, S. Chand & Co. Pvt. Ltd, 2012.
5. Hugh D. Young and Roger A. Freedman, Sears & Zemansky's University Physics with Modern Physics, 14th Edition (2015)