1. Elasticity & Hooke’s Law*

- *Q:* Define stress, strain, and elastic limit. State Hooke’s law.

- *Q:* Explain Young’s modulus, Bulk modulus, and Modulus of rigidity with their SI units.

- *Q:* Draw a stress-strain curve and label key points (elastic limit, yield point, etc.).

- *Repeated in:* 2012, 2015, 2016, 2017, 2019.

2. Surface Tension*

Q:* Define surface tension and its SI unit. Explain it based on molecular theory.

- *Q:* Effects of temperature and impurities on surface tension.

- *Q:* Angle of contact and capillary action (e.g., meniscus shape for water/mercury).

- *Repeated in:* 2012, 2013, 2014, 2015, 2016, 2017, 2018, 2019.

3. Viscosity & Fluid Dynamics

Q: Define viscosity, coefficient of viscosity (SI unit), and Reynolds number.

Q: Newton’s law of viscosity. Difference between streamline and turbulent flow.

Q:* Critical velocity and its relation to viscosity.

Repeated in:* 2013, 2014, 2015, 2016, 2017, 2018.

4. Thermal Physics

Q:* Modes of heat transfer (conduction, convection, radiation) with examples.

Q:* Define thermal conductivity and its SI unit.

Q:* Relation between coefficients of linear (α), superficial (β), and cubical (γ) expansion (α:β:γ = 1:2:3).

Repeated in:* 2012, 2014, 2015, 2016, 2017, 2018, 2019.

5. Waves & Sound*

Q:* Difference between transverse/longitudinal waves and stationary waves (nodes/antinodes).

Q:* Conditions for good acoustics in buildings.

Q:* Resonance and forced vibrations (with examples).

Repeated in:* 2012, 2013, 2014, 2016, 2017, 2018, 2019.

Q:* Snell's law and refractive index (e.g., R.I. of glass w.r.t. water).

Q:* Dispersion vs. diffraction of light.

Q:* LASER properties (stimulated emission, coherence) and applications.

Repeated in:* 2012, 2013, 2014, 2015, 2017.

7. Modern Physics*

Q:* Photoelectric effect (Einstein's equation, work function, K.E. of electrons).

Q:* X-ray production (Coolidge tube) and properties.

Q:* Define photon and Planck's hypothesis.

Repeated in:* 2012, 2013, 2014, 2015, 2016, 2017.

8. Units & Errors

Q:* Significant figures rules (e.g., count in 0.04058).

Q:* Absolute error, relative error, and percentage error.

Repeated in:* 2017, 2018, 2019.

9. Numericals to Practice

1. *Young's Modulus:* Calculate strain given stress and Young's modulus (2018).

2. *Capillary Rise:* Find height change if tube radius is doubled (2012).

3. *Thermal Expansion:* Calculate α and β for a metal rod (2015, 2019).

4. *Photoelectric Effect:* Max K.E. of electrons given threshold frequency (2017).