

SEMESTER - I
CC I - PROPERTIES OF MATTER AND ACOUSTICS

Internal: 25

Subject Code : UPA

External : 75

Exam Hours: 3

Objective:

To identify the characteristics of matter in terms their properties and to know the basic principles of acoustics.

UNIT I Elasticity 18 Hrs

Hooke's law – Stress-Strain diagram – Factors affecting elasticity- Different moduli of elasticity - Relation between the elastic moduli – Poisson's ratio –

Twisting couple on a cylinder – Determination of rigidity modulus by static torsion – Work done in twisting a wire -Torsional oscillations of a body-Torsion pendulum - Determination of rigidity modulus and moment of inertia.

UNIT II Bending of Beams 18 Hrs

Bending of beams - Expression for bending moment – Cantilever – Expression for depression of the loaded end of a cantilever — Young's modulus by measuring the tilt in a loaded cantilever – Oscillation of a cantilever - Non-uniform bending – Expression for depression- Uniform bending – Expression for elevation –Experimental determination of Young's modulus using pin and microscope method (Non-uniform bending – Uniform bending) - Determination of Young's modulus by Koenig's method.

UNIT III Surface Tension 18 Hrs

Definition – Molecular forces – Explanation of surface tension on kinetic theory – Surface energy – Work done on increasing the area of a surface -

Angle of contact - Neumann's triangle- Excess pressure inside a liquid drop and soap bubble - Excess pressure inside a curved liquid surface - Force between two plates separated by a thin layer of a liquid - Experimental determination of surface tension - Jaegar's method - Drop- weight method - Capillary rise method - Variation of surface tension with temperature.

UNIT IV Viscosity 18 Hrs

Newton's law of viscous flow – streamlined and turbulent motion – Reynold's number - Poiseuille's formula for the flow of a liquid through a horizontal capillary tube – Experimental determination of co-efficient of a liquid by

Poiseuille's method - Ostwald's viscometer – Terminal velocity and Stokes' formula - Viscosity of gases – Meyer's formula - Rankine's method - Variation of viscosity with temperature and pressure - Lubrication

Equation of continuity of flow – Euler's equation for unidirectional flow -

Bernoulli's theorem – Filter pump and Wings of aeroplane - Torricelli's theorem - Pitot tube.

UNIT V Acoustics 18 Hrs

Newton's Formula for velocity of sound –Effect of Temperature, Pressure,

Humidity , Density of medium and Wind - Musical Sound and Noise – Speech- Characteristics of Musical sound – Intensity of sound – Measurement of intensity of sound :Decibel and Phon- Bel.

Reverberation – Sabine’s Reverberation formula – Factors Affecting the Acoustics of Buildings – Sound distribution in an Auditorium – Requisites for good acoustics – Ultrasonics – Production and detection – Medical applications of Ultrasonic waves – Acoustic Grating.

Books for Study:

1. R. Murugesan, *Properties of matter*, S. Chand & Co. Pvt. Ltd., Revised edition, 2012.
2. D.S. Mathur, *Elements of Properties of matter*, S. Chand & Co. Pvt.Ltd., Revised edition, 2010
3. Brijlal & N. Subramanyam, *Properties of matter*, Vikas Publishng. Pvt. Ltd, 2005.
4. Brijlal & N. Subramanyam, '*A Text Book of Sound*', Vikas Publishing. Pvt. Ltd, 2008.

Books for Reference:

1. Feynman, *Lectures on Physics*. Vol. I & II by Richard P. Feynman, The New Millennium Edition, 2012.
2. David Halliday and Robert Resnick, *Fundamentals of Physics* by 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. Chatterjee and Sen Gupta, *A treatise on general properties of matter*, New central Books agency (p) Ltd, Kolkata, 2001.
6. R.L. Saihgal, *A Text Book of Sound*, S. Chand & Co. Pvt. Ltd, New Delhi, 1979.

SEMESTER – II
CC II- CORE PRACTICAL I
(Any Twelve Experiments)

Internal: 40

Subject Code : UPBY

External : 60

Exam Hours: 3

Objective:

To motivate and educate the students to acquire skill in physics Experiments.

1. Measurements of length (or diameter) using Vernier calipers, Screw gauge and Travelling microscope.
2. Non uniform bending - Pin & Microscope Method.
3. Cantilever depression—Scale and Telescope Method.
4. Surface Tension, Interfacial Surface Tension– Drop weight Method.
5. Surface Tension by Capillary rise method
6. Joule's Calorimeter - determination of Specific heat capacity of liquid.
7. Compound pendulum - g & k determination.
8. Specific heat capacity of liquid - Newton's law of cooling.
9. Coefficient of viscosity of liquid—Poiseuille's flow method.
10. P.O box – determination of Temperature coefficient.
11. Meter bridge - Specific resistance determination.
12. Comparison of Viscosities of two liquids – Ostwald's Viscometer/ HARE's apparatus
13. Long focus convex lens - f , R , refractive index-determination.
14. Concave lens – Focal length determination.
15. Determination of the Elastic Constants of a Wire by Searle's method.

Books for Study :

1. Dr. S. Somasundaram, *Practical Physics*, Apsara publications, Tiruchirapalli, 2012.
2. Department of Physics, *Practical Physics*, (B.Sc. Physics Main), St. Joseph's College, Tiruchirapalli 1998.

Books for Reference:

1. S. Srinivasan, *A Text Book of Practical physics*, S. Sultan Chand publications. 2005
2. R. Sasikumar, *Practical Physics*, PHI Learning Pvt. Ltd, New Delhi, 2011.

SEMESTER - II

CC III - MECHANICS

Internal: 25

Subject Code : UPC

External : 75

Exam Hours: 3

Objective:

An attempt is made to give a better insight of the change of position of any physical object or event and their consequences.

UNIT I Projectile, Impulse and Impact 18 Hrs

Projectile - particle projected in any direction - Path of a projectile is a parabola - Range of a projectile on plane inclined to the horizontal - Maximum range on the inclined plane - Impulse of a force - Laws of impact - Direct impact between two smooth spheres - oblique impact between two smooth spheres - Impact of a smooth sphere on a smooth fixed horizontal plane - Loss of KE due to direct impact - Oblique impact.

UNIT II Motion on a plane curve 18 Hrs

Centripetal and centrifugal forces - Hodograph - Expression for normal acceleration - Motion of a cyclist along a curved path - Motion of a railway carriage round a curved track- upsetting of a carriage - Motion of a carriage on a banked up curve - Effect of earth's rotation on the value of the acceleration due to gravity - Variation of 'g' with altitude, latitude and depth.

UNIT III Gravitation 18 Hrs

Newton's law of gravitation - Mass and density of earth - Inertial and Gravitation mass - Determination of G-Boy's experiment -Kepler's Laws of planetary motion -Deduction of Newton's law of gravitation from Kepler's Law - Gravitation - Field - potential -Intensity of Gravitational field - gravitational potential due to a point mass - Equipotential surface - Gravitational potential and field due to a spherical shell and solid sphere - Escape velocity -Orbital velocity.

UNIT IV Dynamics of rigid body and Friction 18 Hrs

Moment of Inertia - Kinetic energy and angular momentum of rotating body - Theorems of perpendicular and parallel axes - Acceleration of a body rolling down an inclined plane without slipping - Oscillations of a small sphere on a large concave smooth surface - Compound pendulum - Centre of suspension and centre of oscillation - Centre of percussion - Minimum period of a compound pendulum - Kater's pendulum.

Friction - Laws of friction - Resultant reaction - Angle and cone of friction - Equilibrium of a body on a rough plane inclined to the horizontal - The friction clutch.

**UNIT V Centre of gravity, Centre of Pressure, Floating bodies,
Atmospheric pressure** **18 Hrs**

Centre of gravity of a body - Centre of gravity of a trapezoidal lamina - C.G. of a solid hemisphere - C.G. of a solid tetrahedron - C.G. of a solid cone.

Centre of pressure - rectangular lamina - triangular lamina - triangular lamina immersed in a liquid.

Conditions of equilibrium of a floating body - Stability of equilibrium of a floating body - Metacentre - Experimental determination of a metacentric height of a ship.

The barometer - Fortin's barometer - Correction for a barometer - Faulty barometer - Variation of atmospheric pressure with altitude.

Books for study:

1. M. Narayanamurthi and N. Nagarathinam, *Dynamics*, The National Publishing Company 2005, Chennai.
2. M. Narayanamurthi and N. Nagarathinam, *Statics, Hydrostatics and Hydrodynamics* - The National Publishing Company 2005, Chennai.

Books for reference:

1. R. Murugesan, *Mechanics and Mathematical Physics*, S. Chand & Company Ltd., New Delhi, 2008.
- D.S. Mathur, *Mechanics*, S. Chand & Company Ltd., New Delhi - 1990.