

SYSTEM OF PARTICLES

1. Define centre of mass
2. Show that $L = r \times p$
3. Show that torque $= r \times F$
4. Define perpendicular and parallel axes theorem
5. Show that torque $= dL/dt$
6. Derive expression for rotational kinetic energy
7. Geometrical meaning of angular momentum
8. State and prove law of conservation of angular momentum. with one illustration

GRAVITATION

1. Derive expression for acceleration due to gravity g .
2. variation of g with altitude and depth
3. Derive expression for orbital velocity and escape velocity
4. Derive expression for time period of satellite
5. Define gravitation potential. derive expression for the potential at a point due to a point mass
6. Define gravitational potential energy. Derive expn for the same.
7. Derive expression for the energy of an orbiting satellite.
8. State Kepler's laws of motion.

HEAT AND THERMODYNAMICS

1. Why C_p is greater than C_v ?
2. State Zeroth, first and second law of thermodynamics.
3. Derive Meyer's relation.
4. Differentiate reversible and irreversible process
5. Differentiate Isothermal and Adiabatic process.
6. Parts of heat engine
7. Efficiency of heat engine formula and diagram
8. Define coefficient of performance in refrigerator and diagram
9. State Kelvin's and Clausius statement.
10. Define coefficient of thermal conductivity? (it depends upon the nature of the material)
11. Define conduction, convection and radiation
12. Give any four properties of thermal radiation.
13. State Newton's law of cooling.

SIMPLE HARMONIC MOTION

1. Define SHM
2. Derive velocity and acceleration from displacement eqn $y = A \sin \omega t$ and represent it graphically.
3. Derive expression for the energy of a harmonic oscillator
4. Derive expression for the time period of the simple pendulum
5. Define force constant.
6. What is meant by resonance, forced oscillation and damped oscillation?

MECHANICS OF SOLIDS.

1. Define stress and strain
2. State Hooke's law
3. Explain the behaviour of solids - stress strain graph.
4. Define elastic limit
5. Explain Young's modulus, Bulk modulus and Rigidity modulus.

MECHANICS OF FLUIDS

1. State Pascal's law
2. Derive the relation between surface energy and surface tension
3. Any two applications of surface tension.
4. Derive expression for excess pressure.
5. Derive expression for capillary ascent.

6. Define coefficient of viscosity
7. What is Stoke's law.
8. Define terminal velocity. Derive expression for terminal velocity
9. Differentiate streamlined and turbulent flow
10. Derive the equation of continuity
11. State and prove Bernoulli's theorem. Give two applications of Bernoulli's theorem.