

PHYSICS (Subjective) GROUP - I

Time: 02:40 Hours

Marks: 68

SECTION – I**2. Write short answers to any EIGHT parts.**

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- Write the dimensions of pressure and density.
- Define radian and steradian.
- Two vectors have unequal magnitudes. Can their sum be zero? Explain.
- Suppose the sides of a closed polygon represent vectors arranged head to tail. What is the sum of these vectors?
- Give two factors on which turning effect depends.
- When a rocket re-enters the atmosphere, its nose cone becomes very hot. Where does this heat energy come from?
- Define law of conservation of energy.
- Explain the difference between laminar flow and turbulent flow.
- Define venturi effect. Also write its relation.
- If a mass spring system is hung vertically and set into oscillations, why does the motion eventually stop?
- Describe some common phenomena in which resonance plays an important role.
- Define periodic motion. Give example.

3. Write short answers to any EIGHT parts.

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- At what point or points in its path does a projectile have its minimum speed, its maximum speed?
- Can the velocity of object reverse the direction when acceleration is constant? If so, give an example.
- The horizontal range of projectile is four times of its maximum height. What is angle of projection?
- Define ballistic flight and ballistic trajectory.
- When mud flies off the tyre of a moving bicycle, in which direction does it fly? Explain.
- Why does a diver change his body positions before and after diving in the pool?
- Differentiate between real weight and apparent weight.
- How many radians are there in 2 degree?
- Explain the terms crest, trough node and anti-node.
- How are beats useful in tuning musical instruments?
- Why sound travel faster in hydrogen than in oxygen?
- What do you mean by sonar technique? Explain briefly.

4. Write short answers to any SIX parts.

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- How would you distinguish between unpolarized light and polarized light?
- An oil film spreading over a wet footpath shows colours. Explain how does it happen?
- Under what conditions two or more sources of light behave as coherent sources?
- Why would it be advantageous to use blue light with a compound microscope?
- Differentiate between linear magnification and angular magnification.
- Why does the pressure of a gas in a car tyre increase when it is driven through some distance?
- Is it possible to convert internal energy into mechanical energy? Explain with an example.
- Does the entropy of a system increase or decrease due to friction? Explain briefly.
- State first law of thermodynamics.

SECTION – II Attempt any THREE questions. Each question carries 08 marks.

- Derive Boyle's law and Charles's law from the pressure of a gas equation.
 - Suppose, we are told that the acceleration of a particle moving in a circle of radius r with uniform velocity v is proportional to some power of r , say r^n , and some power of v , say v^m , determine the powers of r and v .
- Define vector product. Write any four characteristics of vector product.
 - A 100g golf ball is moving to the right with a speed of 20ms⁻¹. It makes a head on collision with an 8kg steel ball, initially at rest. Compute velocities of the balls after collision.
- Discuss the inter-conversion of potential and kinetic energy in absence of air friction. Also discuss the effect of air resistance.
 - A stationary wave is established in a string which is 120cm long and fixed at both ends. The string vibrates in four segments, at a frequency of 120Hz. Determine its wavelength and the fundamental frequency.
- What is simple pendulum? Show that motion of simple pendulum is simple harmonic. Also derive expression for its time period.
 - A gramophone record turntable accelerates from rest to an angular velocity of 45 rev. min in 1.60s. What is its average angular acceleration?
- What is simple microscope? Describe its construction, working and also derive the relation for its angular magnification.
 - A light of $\lambda = 589\text{nm}$ is incident normally on grating having 5000 lines per centimeter. What is the highest order, the spectrum obtained with this grating?