

PHYSICS (Subjective) GROUP - I

Time: 02:40 Hours

Marks: 68

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

16

- Why do we find it useful to have two units for the amount of substance, the kilogram and the mole?
- Does a dimensional analysis give any information on constant of proportionality that may appear in an algebraic expression? Explain.
- Write the dimensions of (a) pressure (b) density.
- If percentage uncertainty in radius of sphere is 0.4%, then what will be total uncertainty in its volume?
- Can a body rotate about its center of gravity under the action of its weight?
- Name three conditions that could make, $\vec{A}_1 \times \vec{A}_2 = \vec{0}$
- Draw the diagram of two cases in which components of a vector are equal in magnitude.
- Explain the circumstances in which the velocity $\vec{v}$ and acceleration $\vec{a}$ of a car are (a) $\vec{v}$ is zero but $\vec{a}$ is not zero. (b) $\vec{a}$ is zero but $\vec{v}$ is not zero.
- At what point or points in its path does a projectile have its minimum speed, its maximum speed?
- Which quantities are assumed to be constant in projectile motion?
- What sort of energy is in (a) compressed spring (b) water in a high dam?
- A girl drops a cup from a certain height, which breaks into pieces. What energy changes are involved?

3. Write short answers to any EIGHT parts.

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- Explain how many minimum number of geostationary satellites are required for global coverage of TV transmission.
- Satellites orbiting at different altitudes have different time periods. Explain why?
- Why is it difficult for a car to turn round a corner at high speed than at lower speed?
- A 1000kg car moves with a speed of 40ms^{-1} round a curve of radius 100m. Find the necessary centripetal force.
- Explain how the swing is produced in a fast moving cricket ball?
- What are systolic and diastolic pressures? Also give values.
- Under what conditions, does the addition of two simple harmonic motions produce a resultant, which is also simple harmonic?
- What will be the frequency of a simple pendulum if its length is 1m at place where $g = 9.8\text{ms}^{-2}$?
- Explain briefly the example of electrical resonance.
- How beats are useful in tuning musical instruments?
- Differentiate between red shift and blue shift.
- How the frequency of a string of a musical instrument can be changed?

4. Write short answers to any SIX parts.

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- Can visible light produce interference fringes? Explain.
- Why the polaroid sunglasses are better than ordinary sunglasses?
- Differentiate between a ray and a wave front.
- Why would it be advantageous to use blue light with a compound microscope?
- If a person was looking through a telescope at the full moon, how would the appearance of the moon be changed by covering half of the objective lens?
- What are the necessary conditions for total internal reflection?
- Why specific heat at constant pressure is greater than specific heat at constant volume?
- Why does pressure of a gas in a car tyre increase when it is driven through some distance?
- Explain adiabatic process with two examples.

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

- (a) Define cross product of two vectors. Give examples. Also write the characteristics of cross product. 05
(b) A football is thrown upward with an angle of 30° with respect to horizontal. To throw a 40m pass, what must be initial speed of the ball? 03
- (a) What is gravitational field? Show that work done in the earth gravitational field is independent of the path followed. 05
(b) An organ pipe has a length of 50cm. Find the frequency of its fundamental note and the next harmonic when it is open at both ends. 03
- (a) What is resonance phenomenon? Explain it with examples. 05
(b) A gramophone records turntable accelerates from rest to an angular velocity of 45.0 rev min^{-1} in 1.60s. What is its average angular acceleration? 03
- (a) What is Carnot cycle? Calculate the efficiency of a Carnot engine during one Carnot cycle. 05
(b) A water hose with an internal diameter of 20mm at the outlet discharges 30kg of water in 60 sec. Calculate the water speed at the outlet. Assume the density of water is 1000kgm^{-3} and its flow is steady. 03
- (a) What do you know about diffraction grating? Also derive a relation which involves that image of each wavelength for a certain value of n is diffracted in a different direction. 01,03,01
(b) An astronomical telescope having magnifying power of 5 consists of two thin lenses 24cm apart. Find the focal lengths of the lenses. 03