

Physics (Subjective)**Group-I**

Time: 2:40 hours

SECTION-I

(8x2=16)

2. Write short answers of any eight parts from the following:

- Does all physical measurements are accurate or precise, yes or not, explain.
- How do you calculate final uncertainty in a timing experiment?
- Find the dimension of coefficient of viscosity η in the relation $F = 6\pi\eta r v$.
- Name several repetitive phenomenon occurring in nature which could serve as reasonable time standards.
- How do you multiply a vector by a scalar number?
- Can the magnitude of a vector have a negative value?
- Can a body rotate about its center of gravity under the action of its weight?
- Explain the circumstances in which the velocity and acceleration of a car are (i) Parallel (ii) Anti-parallel.
- Define impulse and how it is related to linear momentum?
- What is meant by a ballistic missile, how it works?
- An object has 1J of potential energy. Explain what does it mean? How much power does it have?
- A girl drops a cup from certain height, which breaks into pieces. Why it happens & what energy changes are involved?

(8x2=16)

3. Write short answers of any eight parts from the following:

- What is meant by angular momentum? Explain the law of conservation of angular momentum.
- When mud flies off the tyre of a moving bicycle, in what direction does it fly? Explain.
- Differentiate between tangential velocity and angular velocity.
- Prove that $2 \text{ radian} = 114.6^\circ$
- A person is standing near a fast moving train. Is there any danger that he will fall towards it?
- What are systolic and diastolic pressures?
- Does frequency depend on amplitude for harmonic oscillators?
- What is meant by phase angle? Does it define angle between maximum displacement and the driving force?
- Show that when a pendulum moves from mean position to half of amplitude, time taken by it is, $t = T/12$.
- A wave is produced along a stretched string but some of its particles permanently show zero displacement. What type of wave is it?
- Why does sound travels faster in solids than in gases?
- Find the temperature of air, if the velocity of sound is 340 ms^{-1} at the temperature.

(6x2=12)

4. Write short answers of any six parts from the following:

- Under what conditions two or more sources of light behave as coherent sources?
- How would you manage to get more orders of spectra using a diffraction grating?
- What is graphical representation of diffraction pattern of monochromatic light produced due to a single slit?
- What do you understand by linear magnification and angular magnifications?
- How power is lost in optical fiber through dispersion? Explain.
- Name the parts of a spectrometer?
- Does entropy of a system increases or decreases due to friction?
- Is it possible to construct a heat engine that will not expel heat into the atmosphere?
- Draw a PV-diagram in case of isothermal process and adiabatic process.

SECTION-II

(8x3=24)

Note Attempt any three questions. Each question carries equal marks:

- Derive the expression for the final velocities of two hard smooth balls after their elastic collision in one dimension. (5)
 - Find the angle between the two vectors. $\vec{A} = 5\hat{i} + \hat{j}$ and $\vec{B} = 2\hat{i} + 4\hat{j}$ (3)
- Which field is produced by the earth? Prove that the work done in this field is independent of the path followed and work done in a closed path be zero. (5)
 - 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 120 Hz. Determine its wavelength and fundamental frequency. (3)
- What is resonance phenomenon? Explain it with examples. (5)
 - A gramophone record turntable accelerates from rest to an angular velocity of 45.0 rev / min in 1.60 seconds. What is the average angular acceleration. (3)
- How does the pressure of a gas in a container is directly proportional to average translational kinetic energy. (5)
 - An airplane wing is designed so that when the speed of the air across the top of the wing is 450 ms^{-1} , the speed of air below the wing is 410 ms^{-1} . What is the pressure difference between the top & bottom of the wings? (Density of air $= 1.29 \text{ kg m}^{-3}$) (3)
- Discuss Michelson's interferometer in detail. (5)
 - An astronomical telescope having magnifying power of 5 consist of two thin lenses 24cm apart. Find focal lengths of lenses. (3)