

**PHYSICS**

PAPER : PART - I

TIME : 2:40 Hours

019/1

INTERMEDIATE )

(SUBJECTIVE PART)

MARKS: 68

**SECTION - I**

2- Write short answers of any eight parts. (2 x 8 = 16)

i	Why do we find it useful to have two units for the amount of substance, the kilogram and the mole?	ii	Show that the famous "Einstein equation" $E=mc^2$ is dimensionally consistent.
iii	Two vectors have unequal magnitudes. Can their sum be equal to zero? Explain.	iv	Name the three different conditions that could make $\vec{A}_1 \times \vec{A}_2 = \vec{O}$ ?
v	Can a body rotate about its center of gravity under the action of its weight? Explain.	vi	A boy uses a catapult to throw a stone which accidentally smashes a green house window. List the possible energy changes.
vii	Describe two common methods of conversion of biomass in to fuels.	viii	Explain the difference between Laminar flow and turbulent flow?
ix	Explain, how the swing is produced in a fast moving cricket ball?	x	Does frequency depends on amplitude for harmonic oscillators? Explain.
xi	Differentiate between Free and Forced Oscillations.	xii	Show that in (SHM) simple harmonic motion, the acceleration is zero when the velocity is greatest and the velocity is zero when the acceleration is greatest?

3- Write short answers of any eight parts. (2 x 8 = 16)

i	Explain the difference between tangential velocity and the angular velocity. If one of these is given. How will you find the other?	ii	What is difference between inertia and moment of inertia?
iii	Define critical velocity and find its value.	iv	Explain why an object orbiting around the earth is said to be free falling?
v	What is difference between instantaneous and average velocity? In which situation both velocities are equal?	vi	An object is thrown up word with initial velocity $v_i$ . How much height it gain interms of velocity?
vii	Prove that $F = \frac{\Delta p}{\Delta t}$	viii	If the angle of projection of a projective is zero. What is its maximum height?
ix	Write down the common and different features of longitudinal waves with transverse waves.	x	Is sound travel faster in warm air then in cold air? Explain.
xi	Explain the terms in phase and out of phase.	xii	What is the effect of density on the speed of sound?

4- Write short answers of any six parts. (2 x 6 = 12)

i	How would you manage to get more orders of spectra using a diffraction grating?	ii	An oil film spreading over a wet footpath shows colours. Explain how does it happen?
iii	Could you obtain Newton's rings with transmitted light? If yes, would the pattern be different from that obtained with reflected light?	iv	What is least distance of distinct vision? Give its value.
v	Briefly explain resolving power of an optical instrument. Give its formula.	vi	Explain why the average velocity of the gas molecules in a gas is zero but the average of the square of velocities is not zero?
vii	Specific heat of a gas at constant pressure is greater than specific heat at constant volume. Why.	viii	Give an example of a natural process that involves the increase of entropy.
ix	A thermos flask containing milk as a system is shaken rapidly. Does the temperature of the milk rise? Explain briefly.		

**SECTION - II**

Note:- Attempt any three questions. (8 x 3 = 24)

5	(a)	Derive a relation for time period of a simple pendulum using dimension analysis. The various possible factors on which time period "T" may depend are 1. mass of the body. 2. length of the pendulum. 3. angle " $\theta$ " that thread makes with vertical. 4. acceleration due to gravity	(05)
	(b)	336J of energy is required to melt 1g of ice at $0^\circ\text{C}$ . What is the change in entropy of 30g of water at $0^\circ\text{C}$ as it is changed to ice at $0^\circ\text{C}$ by a refrigerator?	(03)
6	(a)	Define scalar product. Give its four characteristics.	(05)
	(b)	A ball is thrown horizontally from a height of 10m with velocity $21\text{ms}^{-1}$ . How far off it hit the ground and with what velocity?	(03)
7	(a)	What is absolute gravitational potential energy? Derive an expression for it.	(05)
	(b)	Find the temperature at which the velocity of sound in air is two times its velocity at $10^\circ\text{C}$ .	(03)
8	(a)	What are geostationary orbits and geostationary satellites? Derive an expression for the orbital radius of a geostationary orbit.	(05)
	(b)	Find the amplitude, frequency and period of an object vibrating at the end of an spring, if the equation for its position, as a function of time, is $x = 0.25 \cos\left(\frac{\pi}{8}t\right)$	(03)
9	(a)	Derive Bragg Equation for diffraction of X-Rays by Crystals.	(05)
	(b)	An astronomical telescope having magnifying power of 5 consist of two thin Lenses 24 cm apart. Find the focal lengths of Lenses.	(03)

(The End)