INDIAN SCHOOL MUSCAT
SECOND TERM - EXAMINATION

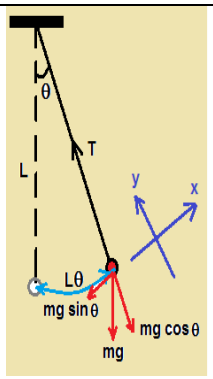
PHYSICS (042)

CLASS: XI **TERM 2** **Max. Marks: 35**

SET-B

MARKING SCHEME

	QN.NO	VALUE POINTS	MARKS SPLIT UP
		SECTION A	
	1.	(a) According to first law of thermodynamics: - The change in the internal energy of a closed system is equal to the amount of heat supplied to the system, minus the amount of work done by the system on its surroundings. $\Delta Q = \Delta U + \Delta W$ Where: ΔQ is the heat supplied to the system by the surroundings ΔW is the work done by the system by the surroundings ΔU is the change in internal energy of the system.	**1** **1**
	2.	(a) Wien's displacement law states that the black-body radiation curve for different temperatures will peak at different wavelengths that are Inversely proportional to the temperature. (b) Latent heat of fusion of a solid is defined as the amount of heat required to convert a unit mass of the substance from the solid state to the liquid state Without changing the temperature. (OR) (a) Stefan's law of radiation: The quantity of radiant energy emitted by a perfect blackbody per unit time per unit surface area of the body is directly proportional to the fourth power of its absolute temperature. (b)Latent heat of vaporization is defined as the amount of heat required to convert a unit mass of the substance from the liquid state to the vapors state without changing the temperature.	**1** **1** **1** **1**
	3.	differences between transverse and longitudinal waves.	**1 +1**
		SECTION – B	
	4.	A motion be Simple harmonic motion only when, 1. Acceleration of particle is just opposite to motion of body 2. Acceleration is directly proportional to displacement e.g., $a = -\omega^2 x$	**1 dig.**



restoring force, F = -mg sin θ , ½

When displacement of pendulum is very small , then sinθ ≈ θ

so, F = -mg θ, also here it is clear , θ = x/L

∴F = -mg x/L ½

Now use F = ma { Newton's second law }

ma = -mg x/L ⇒ a = -g x/L

Now, compare both the expressions , ½

$\therefore \omega^2 = g/L$

we know, ω = 2π/T , here T is time period .

so, $\{2\pi/T\}^2 = g/L$

$\Rightarrow T = 2\pi\sqrt{\{L/g\}}$ ½

Hence, for pendulum time period is $T = 2\pi\sqrt{\{L/g\}}$

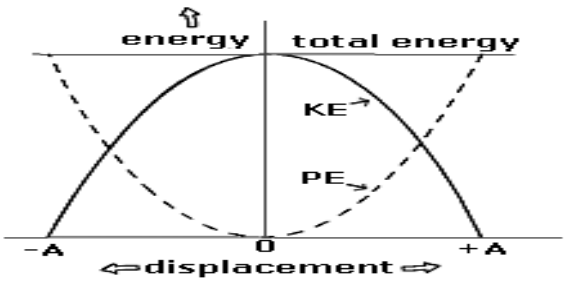
(OR)

Derivation for total energy of the particle executing simple harmonic motion.

Expression for KE ½

Expression for PE **1½**

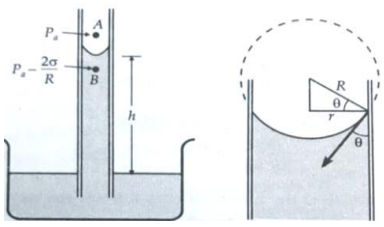
The variation of kinetic energy and potential energy with displacement.

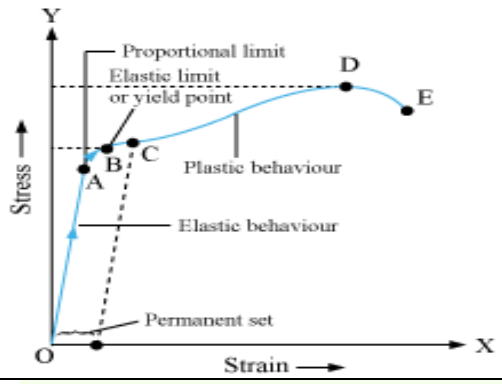


1

5. (a) Any four postulates of kinetic theory of Gases. **4 x ½**

(b) The law of the equipartition of energy states that for a dynamical system in thermal equilibrium that the total energy of the system is shared equally by all the degrees of freedom. **1**

	6.	Let 1 and 2 represent for Argon atom and Helium ator rms speed of Argon, $v_{rms_1} = \sqrt{\frac{3RT_1}{M_1}}$ rms speed of Helium, $v_{rms_2} = \sqrt{\frac{3RT_2}{M_2}}$ According to question, $v_{rms_1} = v_{rms_2}$ $\therefore \sqrt{\frac{3RT_1}{M_1}} = \sqrt{\frac{3RT_2}{M_2}}, \frac{T_1}{M_1} = \frac{T_2}{M_2}$ or $T_1 = \frac{T_2}{M_2} \times M_1 = \frac{253}{4} \times 39.9 = 2.52 \times 10^3 K$	**1** **1** **1**
	7.	***(a)*** Statement of zeroth law of thermodynamics (b) The second law of thermodynamics states that the heat energy cannot transfer from a body at a lower temperature to a body at a higher temperature without the addition of energy. (c) Work	**1** **1** **1**
	8.	Terminal velocity, steady speed achieved by an object freely falling through a gas or liquid. ... At terminal velocity, air resistance equals in magnitude the weight of the falling object. Because the two are oppositely directed forces, the total force on the object is zero, and the speed of the object has become constant. Derivation for terminal velocity: $\implies v = \frac{2}{9}\frac{r^2 g(\rho - \sigma)}{\eta}$	½ ½ **Dig.** **2**
	9.	Consider a **capillary tube of radius r dipped in a liquid of surface tension σ and density ρ. As the pressure is greater on the concave side of a liquid surface,** $p = \frac{2\sigma}{R}$ where R = radius of curvature of the concave meniscus Due to this excess pressure, the liquid rises In the capillary tube to height h, $p\ \frac{r}{R} = \cos\theta$; $R = \frac{r}{\cos\theta}$; $p = \frac{2\sigma\cos\theta}{r} = h\rho g$ $h\rho g = \frac{2\sigma\cos\theta}{r}$; **$h = \frac{2\sigma\cos\theta}{r\rho g}$**  	½ ½ ½ **1** ½ **diagram**

	10.		**1 diagram** **4 x ½ for marking Each point**
	11.	From pascal's law $P_1 = P_2$ $\frac{F_1}{A_1} = \frac{F_2}{A_2}$ $\frac{F_1}{\pi r_1^2} = \frac{F_2}{\pi r_2^2}$ $F_1 = \frac{F_2 r_1^2}{r_2^2}$ $F_1 = \frac{1350 \times 9.8 \times (5 \times 10^{-2})^2}{(15 \times 10^{-2})^2}$ $F_1 = 1470\,N$ $F_1 = 1.47 \times 10^3\,N$ $P_1 = F_1 / A_1$ $P_1 = 1.9 \times 10^5$ Pa (OR) H = 2T Cos θ / rdg Substitution of vaues = 2.8 x 10^{-2} N / m	½ ½ ½ ½ ½ **1** **1** **1**
		SECTION C	**1 x 5 = 5**
	12	(i) C (ii) A (iii) B (iv) C (v) B	