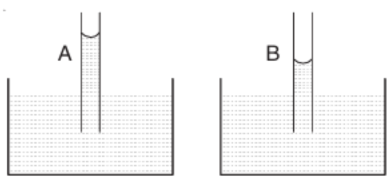
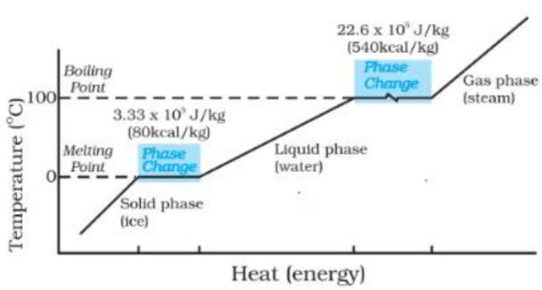
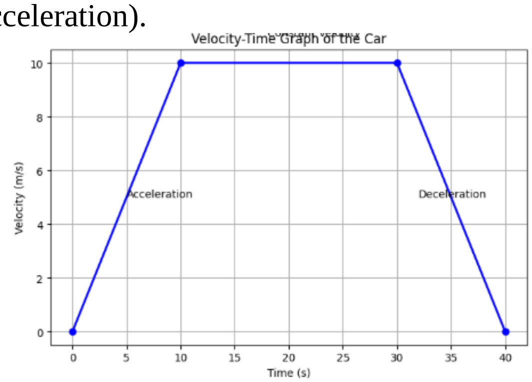
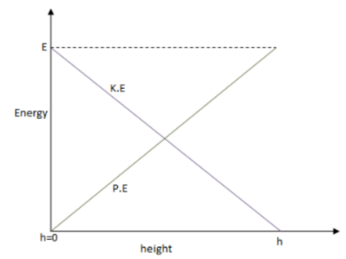
INDIAN SCHOOL AL WADI AL KABIR
CLASS XI
PHYSICS
FINAL EXAMINATION (2025 - 26)
SET 2
ANSWER KEY

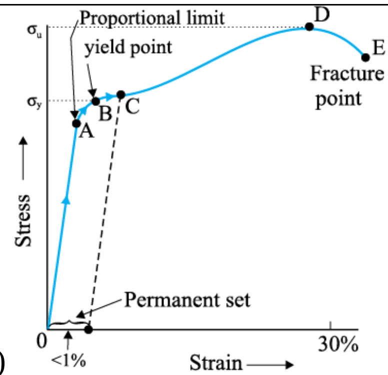
Q.NO.	ANSWERS	MARKS
1	(A) i) → b), ii) → a), iii) → d), iv) → c)	1
2	(B)3 km	1
3	(D)The area under a force–displacement graph represents work done.	1
4	(B)$W_A > W_B$ and $W'_A < W'_B$	1
5	(B) L/4	1
6	(B)The acceleration vector is tangent to the circle	1
7	(B)W/2	1
8	(C) 	1
9	(C)Steam at 100°C carries more heat than water at 100°C	1
10	(A) the temperature will decrease	1
11	(C)3/2 k_BT	1
12	(A) All the particles are vibrating in the same phase	1
13	(C)Assertion is true but Reason is false.	1
14	(A)Both Assertion and Reason are true and Reason is the correct explanation of Assertion.	1
15	(D)Both Assertion and Reason are false.	1
16	(C)Assertion is true but Reason is false.	1
17	$[x^2] = L^2 \Rightarrow [b] = L^2$ $[a] = \frac{L^2}{(ML^2T^{-3})(T)} = \frac{L^2}{ML^2T^{-2}} = M^{-1}T^2$	2
18	 i) ii) Definition and SI unit Jkg^{-1}	1 ½ + ½

19	$$\frac{2\pi}{\lambda} = 0.010\pi$$ $$\lambda = \frac{2}{0.010} = 200 \text{ cm}$$ $$\boxed{\lambda = 200 \text{ cm} = 2.0 \text{ m}}$$ $$\frac{2\pi}{T} = 2.0\pi \Rightarrow T = 1 \text{ s}$$ $$v = \frac{\lambda}{T} = \frac{200 \text{ cm}}{1 \text{ s}}$$ $$\boxed{v = 200 \text{ cm s}^{-1} = 2.0 \text{ m s}^{-1}}$$	½ ½ ½ ½
20	i) The body is moving with **uniform acceleration** (constant acceleration). ii)  **OR** i) a)negative acceleration b) positive acceleration ii) Yes. For example, a ball thrown vertically upward has **zero speed at its maximum height**, but **acceleration due to gravity is non-zero** (directed downward).	1 1 ½ + ½ ½ + ½
21	i) As the person moves towards the centre, the **moment of inertia decreases**, so the **angular velocity of the platform increases**. This is due to **conservation of angular momentum**. ii) When no external torque acts, **angular momentum remains constant**. Angular velocity remains constant **only if the moment of inertia does not change**; otherwise, it can vary. **OR** $L = I\omega$ $K = \frac{1}{2}I\omega^2$	1 1 ½ ½

	Rotational kinetic energy $K = \frac{L^2}{2I}$. Since $I_A > I_B$ and L is equal, $$K_A < K_B$$ **Thus, body B has greater rotational kinetic energy.**	1
22	i) $F = mg = 80 \times 9.8 = 784\ \mathrm{N}$ ii) $F = m(g+a) = 80(9.8+2) = 80 \times 11.8 = 944\ \mathrm{N}$ iii) $F = mg = 80 \times 9.8 = 784\ \mathrm{N}$	1 1 1
23	i) Diagram/Consideration Proof ii) 	½ 1 ½ 1
24	i) Statement ii) Diagram Explanation	1 1 1
25	$\Delta L = \frac{FL}{AY}$ $\frac{\Delta L_s}{\Delta L_c} = \frac{Y_c}{Y_s}$ $\frac{\Delta L_s}{\Delta L_c} = \frac{12 \times 10^{10}}{20 \times 10^{10}} = \frac{12}{20} = \frac{3}{5}$	½ ½ ½ ½ ½

	$\Delta L_s + \Delta L_c = 1\ \text{cm}$ $\frac{3}{5}\Delta L_c + \Delta L_c = 1\ \text{cm}$ $\frac{8}{5}\Delta L_c = 1\ \text{cm}$ $\Delta L_c = \frac{5}{8}\ \text{cm} = 0.625\ \text{cm}$ $\Delta L_s = 1\ \text{cm} - \Delta L_c = 1\ \text{cm} - 0.625\ \text{cm} = 0.375\ \text{cm}$	½
26	i) Statement ii) Proof	1 2
27	$\frac{GmM_s}{(r-x)^2} = Gm\frac{M_e}{x^2}$ ((r-x)/x)^2 $= \frac{M_s}{M_e}$ $\frac{r-x}{r} = \left(\frac{2\times10^{30}}{60\times10^{24}}\right)^{\frac{1}{2}} = 577.35$ $1.5\times10^{11} - x = 577.35x$ $x = \frac{1.5\times10^{11}}{578.35} = 2.59\times10^{8}\ \text{m}$ **OR** $\frac{g_M}{g_E} = \frac{\frac{GM_M}{R_M^2}}{\frac{GM_E}{R_E^2}} = \frac{M_M}{M_E}\left(\frac{R_E}{R_M}\right)^2$ $\frac{g_M}{g_E} = 0.11\times\left(\frac{6370\ \text{km}}{3440\ \text{km}}\right)^2 \approx 0.377$ $g_M = 0.377\times g_E = 0.377\times9.8\ \text{m/s}^2 \approx \mathbf{3.70}\ \text{m/s}^{\mathbf{2}}$	3 1

	$$m = \frac{W_E}{g_E} = \frac{200\text{ N}}{9.8\text{ m/s}^2} \approx 20.41\text{ kg}$$ $$W_M = m \times g_M = 20.41\text{ kg} \times 3.70\text{ m/s}^2 \approx \mathbf{75.44}\text{ N}$$	½ + ½ ½ + ½
28	$$T = \frac{\text{Total time}}{\text{Number of oscillations}} = \frac{14}{7} = 2\text{ s}$$ $$\omega = \frac{2\pi}{T} = \frac{2\pi}{2} = \pi\text{ rad/s} \approx 3.142\text{ rad/s}$$ $$v = \omega\sqrt{A^2 - x^2}$$ $$1.26 = \pi\sqrt{A^2 - 3^2} = 3.142\sqrt{A^2 - 9}$$ $$\sqrt{A^2 - 9} = \frac{1.26}{3.142} \approx 0.401$$ $$A^2 - 9 = 0.1608$$ $$A^2 = 9 + 0.1608 = 9.1608$$ $$A = \sqrt{9.1608} \approx 3.03\text{ m}$$ $$a_{\max} = \omega^2 A = (\pi)^2 \cdot 3.03 \approx 29.9\text{ m/s}^2 \approx 30\text{ m/s}^2$$	½ ½ ½ ½ ½ + ½
29	(I) $$Y = \frac{\text{Stress}}{\text{Strain}} = \frac{F/A}{\Delta L/L} = \frac{FL}{A\Delta L}$$ $$Y \propto \frac{1}{\Delta L} \quad \Rightarrow \quad Y_A : Y_B = \frac{1}{4} : \frac{1}{7} = 7:4$$ $$\boxed{Y_A : Y_B = 7:4}$$ (II)Statement SI unit N/m^2	½ ½ ½ ½ 2

	(III) 	
30	(I) (A)less than that of the bullet (II) (B) 2mv (III) (D)Newton's second and third laws together (IV) (C)Moves with momentum p in the opposite direction	1 1 1 1
31	(A)Graph Time of flight expression Horizontal range expression (B) $T = \frac{2u\sin\theta}{g}$ $R = \frac{u^2 \sin(2\theta)}{g}$ T = 20s $R = \frac{38416 \times 0.866}{9.8}$ $R \approx 3394.82\,\text{m}$ **OR** (A)Definition Diagram Steps+Expression (B) $v = 2160\ \text{km/h} \times \frac{1000\ \text{m}}{1\ \text{km}} \times \frac{1\ \text{h}}{3600\ \text{s}} = 600\ \text{m/s}$ $a_c = \frac{v^2}{r}$ $a_c = \frac{(600\ \text{m/s})^2}{5500\ \text{m}} = \frac{360000\ \text{m}^2/\text{s}^2}{5500\ \text{m}} \approx 65.45\ \text{m/s}^2$	1 1 1 ½ ½ ½ ½ 1 1 1 ½ ½ ½

	$$\text{Ratio} = \frac{a_c}{g} = \frac{65.45\ \text{m/s}^2}{9.8\ \text{m/s}^2} \approx 6.68$$	½
32	(A) Satetment Diagram/Consideration Steps Final answer	1 ½ 1 ½
	(B) $P_1 + \frac{1}{2}\rho v_1^2 = P_2 + \frac{1}{2}\rho v_2^2$	½
	$P_1 = P_2 + \frac{1}{2}\rho v^2$	
	$\frac{1}{2}\rho v^2 = P_1 - P_2$	½
	$v = \sqrt{\frac{2(P_1 - P_2)}{\rho}}$	
	$v = \sqrt{\frac{2(3.5 \times 10^5 - 3 \times 10^5)}{1000}} = \sqrt{\frac{2 \cdot 0.5 \times 10^5}{1000}} = \sqrt{\frac{1 \times 10^5}{1000}} = \sqrt{100} = 10$ m	1
	OR (A) Definition Diagram/consideration Steps Final expression	 1 ½ 1 ½
	(B)	
	$v_t = \frac{2r^2 g(\rho_w - \rho_m)}{9\eta}$	½
	$v_t = \frac{2 \times (1 \times 10^{-5}\ \text{m})^2 \times 9.8\ \text{m/s}^2 \times (1000\ \text{kg/m}^3 - 1.21\ \text{kg/m}^3)}{9 \times 1.8 \times 10^{-5}\ \text{Ns/m}^2}$	
	$v_t = \frac{2 \times 1 \times 10^{-10} \times 9.8 \times 998.79}{1.62 \times 10^{-4}}$ m/s	½
	$v_t \approx 0.0121$ m/s	
	$F_v = 6\pi\eta r v_t$	½
	$F_v = 6\pi \times 1.8 \times 10^{-5}\ \text{Ns/m}^2 \times 1 \times 10^{-5}\ \text{m} \times 0.0121\ \text{m/s}$	
	$F_v \approx 4.10 \times 10^{-11}$ N	½

33	(A)Diagram/ Consideration Steps + Final expression (B) $$T = 2\pi\sqrt{\frac{1}{g}}$$ where. 1 is the length of the pendulum $$\therefore \quad 1 = \frac{T^2}{(2\pi)^2} \times 2$$ $$= \frac{(3.5)^2}{4 \times (3.14)^2} \times 9.8\,m$$ The length of the pendulum remains constant On the moon's surface, time period. $$T' = 2\pi\sqrt{\frac{1}{g'}}$$ $$= 2\pi\sqrt{\frac{\frac{(3.5)^2}{4 \times (3.14)^2} \times 9.8}{1.7}}$$ $= 8.4\,s$ **OR** (A) Expression for velocity Expression for kinetic energy Expression for potential energy Total energy expression (B) $a = \omega^2 x$ $\omega^2 = 3\,s^{-2}$ $v = \sqrt{3 \times (4^2 - 2^2)}$ $v = \sqrt{3 \times 12}$ $v = \sqrt{36}$ V= 6 cm/s	1 2 ½ ½ ½ ½ 1 ½ ½ 1 ½ ½ ½