

2026年度 大阪大学 前期 物理

〔1〕

- I. 問1 $l = l_0 + \frac{mg}{\alpha}$ 問2 $T_1 = 2\pi\sqrt{\frac{m}{\alpha}}$ 問3 $\Delta U = 2mgH$
- II. 問4 $F_C = -\frac{2kqQ}{(L^2 + x^2)^{\frac{3}{2}}}x$ 問5 $\beta = \alpha + \frac{2kqQ}{L^3}, \quad x_1 = -\frac{mgL^3}{\alpha L^3 + 2kqQ}$
- 問6 $Q_2 = 5Q_1$
- 問7 (a) $(x_0 - x_1)\sqrt{\frac{\beta}{m}}$ (b) $\frac{1}{2}\alpha(x_0^2 - x_1^2)$ (c) $mg(x_0 - x_1)$ (d) $\frac{kqQ(x_0^2 - x_1^2)}{L^3}$
- 問8 (イ)
- III. 問9 $T_2 = 2\pi\sqrt{\frac{m}{\beta}}$ 問10 $q' = q + \frac{\alpha L^3}{2kQ}$

〔2〕

- I. 問1 アルミニウム：(あ), リン：(い) 問2 $F = qvB_a$ 問3 $E = \frac{IB_a}{qndh}$
- 問4 $n = \frac{IB_a}{qhV_{AB}}$ 問5 (え), (き)
- II. 問6 $F_E = \frac{qV_E}{L}$ 問7 $v = \frac{qV_E}{cL}$ 問8 $\rho = \frac{dhV_E}{LI_E}$
- 問9 $c = nq^2\rho$
- III. 問10 (a) (く) (b) (つ) 問11 $B = 3.2 \times 10^{-5} \text{ T}$

〔3〕

- A. 問1 $T_A = \frac{6p_0V_0}{R}, \quad T_B = \frac{12p_0V_0}{R}, \quad T_C = \frac{2\alpha p_0V_0}{R}$ 問2 $Q_{AB} = 9p_0V_0, \quad \Delta U = 9p_0V_0$
- 問3 (a) $-\frac{2p_0}{(\alpha-3)RV_0}$ (b) $\frac{2(2\alpha-3)p_0}{(\alpha-3)R}, \quad x = \frac{9}{2}$ 問4 $y = \frac{15}{2}$
- 問5 $Q_{BC} = 33p_0V_0, \quad e = \frac{1}{6}$
- B. I. 問6 (a) $\frac{\sin(\theta_1 + \theta_2)}{\sin\theta_2}$ (b) $R\sin\theta_2$ (c) $L_{FB}\tan\theta_1$
- (d) $\frac{L_{FB}}{\sqrt{R^2\sin^2\theta_2 + L_{FB}^2}}$ (e) $\frac{R\sin\theta_2}{\sqrt{R^2\sin^2\theta_2 + L_{FB}^2}}$ (f) $\frac{R\cos\theta_2 + L_{FB}}{\sqrt{R^2\sin^2\theta_2 + L_{FB}^2}}$
- II. 問7 $f_A = \frac{n_A}{n - n_A}R$ 問8 $h' = \frac{f_A}{f_A - a}h$