

$$235 = Z + 141 - 1 \Rightarrow Z = 93 \quad \Rightarrow N = 235 - 93 = 142$$

$$235 = A + 141 + 0 \Rightarrow A = 235$$

گزینه (د) ۲۰۹

۲۰۷ گزینه (ب)
نمودار روند گذارهای هسته و حساب کردن بازه
۱.۵۲ ایزوتوپ نئوپتیم

۲۰۸ گزینه (د)
چون شیب خط واحد نمودار $v-t$ شتاب است
میب خوا واصل $0-t_r$
میب خوا واصل t_1-t_r

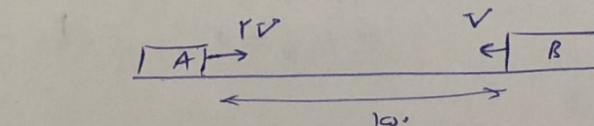
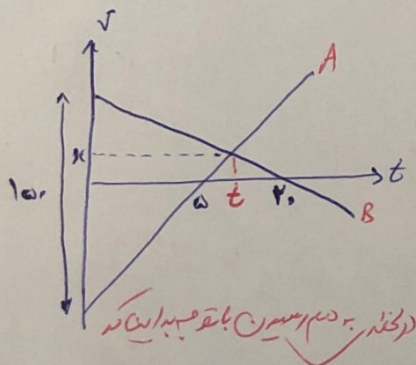
$$\bar{a} = \frac{\Delta v}{\Delta t}$$

$$-4i = \frac{v_{12} - v_0}{\omega} \Rightarrow v_{12} - v_0 = -4\omega i \Rightarrow v_{12} = -4\omega i + v_0$$

$$r_i = \frac{v_{12} - v_0}{r} \Rightarrow v_{12} - v_0 = r i$$

$$v_{12} - (-4\omega i + v_0) = r i \Rightarrow v_{12} - v_0 = r i - 4\omega i = -14\omega i$$

$$\bar{a}_{\omega-r} = \frac{v_{12} - v_0}{12-\omega} = \frac{-14\omega i}{12-\omega}$$



$$s = vt \Rightarrow 100 = vt \times 10 \Rightarrow v = \frac{100}{10} = 10 \text{ m/s}$$

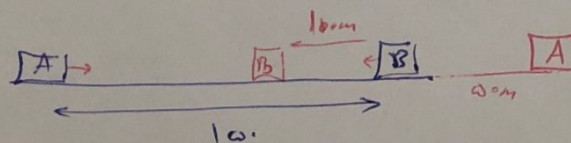
$$s_A = v_A t = 10 \times 10 = 100$$

$$s_B = v_B t = 10 \times 10 = 100$$

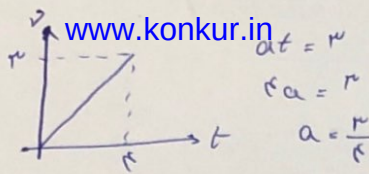
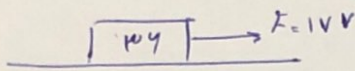
$$\frac{s}{t} = \frac{v}{t} \Rightarrow \frac{100}{t} = \frac{10}{10-t}$$

$$10t - 100 = 10 - t$$

$$11t = 110 \Rightarrow t = 10$$



$$s_{AB} = 100 + 100 = 200 \text{ m}$$



(P11)

$$F - f_k = ma$$

$$10V - f_k = m \times \frac{r}{k} \Rightarrow f_k = 10V - rV = 100$$

$$R = \sqrt{f_k^2 + F_N^2} = \sqrt{(100)^2 + (rV)^2} = \boxed{130 \text{ N}}$$

$$mg = k \Delta l$$

$$10m = 200 \times \frac{10}{100}$$

$$\boxed{m = 2 \text{ kg}}$$

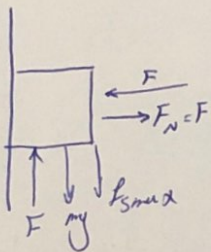
در این حالت
بسیار کم است
که در این حالت
حرکت است و به این
+j

$$k \Delta l = m(g - a)$$

$$200 \times \frac{10}{100} = 2(10 - a) \Rightarrow 10 = 20 - 2a$$

$$2a = 10 \Rightarrow a = \frac{10}{2} = 5 \text{ m/s}^2$$

(P12)



$$f_{s \max} + mg = F$$

$$\mu F + mg = F$$

$$\mu F = F - mg$$

$$\boxed{F = \frac{mg}{1 - \mu}}$$

$$\Rightarrow \boxed{f_{s \max} = \mu F}$$

$$R = \sqrt{F^2 + \mu F^2} = \boxed{F \sqrt{1 + \mu^2}}$$

$$F = 40 \rightarrow f_{s \max} = \mu F$$

$$f_{s \max} + mg > F \rightarrow \text{حرکت}$$

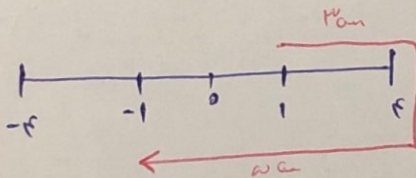
$$f_s + F = mg$$

$$f_s + mg = F \Rightarrow \boxed{f_s = F - mg}$$

$$R' = \sqrt{f_s^2 + 40^2} = \boxed{40 \sqrt{10}}$$

$$\frac{R'}{R} = \frac{40 \sqrt{10}}{40 \sqrt{2}} = \boxed{\frac{\sqrt{5}}{2}}$$

(P13)



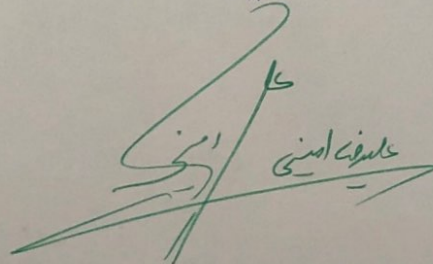
$$a = v_{\text{cm}} + \omega a = \boxed{10 \text{ cm} = 10 \text{ A}}$$

$$10 \text{ A} \rightarrow \frac{F}{r} \Rightarrow \frac{F}{r} = 10 \rightarrow F = 10r \Rightarrow F = \frac{1}{10} \text{ Hz}$$

$$E = 2m(\pi A f)^2 = 2 \times \frac{200}{1000} \times 10 \times \frac{1}{10000} \times \frac{1}{10} = \frac{2}{10000} \text{ J} = \boxed{0.2 \text{ mJ}}$$

$$\frac{\mu \lambda}{r} = \omega \Rightarrow \lambda = \frac{r \omega}{\mu}$$

$$f = \frac{c}{\lambda} = \frac{c \times 10^1}{r \times 10^{-9}} = 10^{10} \text{ Hz} \Rightarrow \boxed{T = 10^{-10} \text{ s}}$$



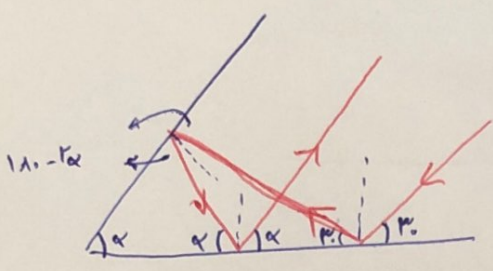
$\frac{\omega \lambda}{c} = 1.0 \text{ nm} \Rightarrow \lambda = 1.0 \text{ nm} \rightarrow \lambda = \frac{c}{\nu} \Rightarrow \nu = \frac{c}{\lambda} = \frac{3 \times 10^8}{1} = 3 \times 10^8 \text{ s}^{-1}$

(۲۱۶)

در صورت $\frac{2.5}{1.0}$ باشد ۱۲ فوتون کامیابی (۱۲ × $\frac{2.5}{1.0}$) با توجه به فوتون کامیابی (۱) انجم می‌دهد

در هر فوتون کامیابی ۴A می‌شود $\Rightarrow \nu = \frac{1.2 \times 10^8 \times 4A}{9.2 \times 10^8} \Rightarrow A = 0.10 \text{ nm} = 10 \text{ nm}$

تغییر (۲)



$1.0 - 2\alpha = 3.0 + \alpha$
 $3\alpha = 1.0$
 $\alpha = 0.33$

(۲۱۷) تغییر (۳)

$E_0 - E_f = hf \Rightarrow -9.44 \text{ eV} - (-1.850) = E \times 10^{-19} \text{ J}$
 $f = \frac{7.59 \times 10^{-19}}{6.6 \times 10^{-34}} = 1.15 \times 10^{16} \text{ Hz}$

تغییر (۲)

$f = \frac{c}{\lambda} \times 10^{10} \rightarrow \lambda = \frac{c}{f} = \frac{3 \times 10^8}{9 \times 10^{10}} = 3.3 \times 10^{-3} \text{ m}$

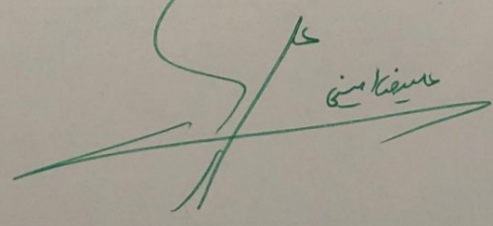
(۲۱۹) تغییر (۲)

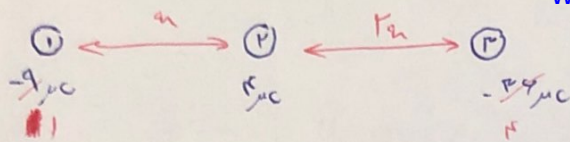
$\frac{1}{\lambda} = R \left(\frac{1}{n_1^2} - \frac{1}{n_2^2} \right) \Rightarrow \frac{1}{\lambda} = \frac{1}{\lambda_0} \left(1 - \frac{1}{n^2} \right) \Rightarrow \frac{\lambda}{\lambda_0} = 1 - \frac{1}{n^2}$
 $\frac{1}{n^2} = 1 - \frac{\lambda}{\lambda_0} \Rightarrow \frac{1}{n^2} = \frac{\lambda_0 - \lambda}{\lambda_0} \Rightarrow \lambda_0 = \lambda \frac{n^2}{n^2 - 1}$

(۲۲۰) از BA حرکت می‌کند ← خلاف جهت میدان ← تغییر افزایش

از B حرکت می‌کند ← خلاف جهت میدان ← حرکت به سمت +ها ← آ، است می‌کند ← اندک کاهش

تغییر (۱)

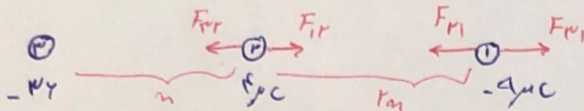




$$F_{12} = \frac{q_1 \times q_2 \times 9}{r_{12}^2} = \frac{q \times q_0}{r^2}$$

$$F_{12} = \frac{175 \times q_0}{r^2}$$

$$F_{13} = \frac{q_1 \times q_3 \times 9}{r_{13}^2} = \frac{1 \times 5 \times q_0}{r^2}$$

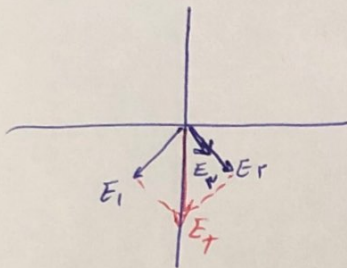


$$F_{12} = F_{13} = \frac{q \times q_0}{r^2}$$

$$F_{12} = \frac{175 \times q_0}{r^2}$$

$$F_{13} = \frac{q_1 \times q_3 \times 9}{r_{13}^2} = \frac{40 \times 14 \times q_0}{r^2}$$

$$\frac{F_{12}}{F_{13}} = \frac{\frac{175 \times q_0}{r^2}}{\frac{40 \times 14 \times q_0}{r^2}} = \frac{175}{560} = \frac{1}{3.2} \quad \text{--- (A)}$$



$$E_1 = \frac{q_1 \times 9 \times 17 \times 10^{-9}}{4 \times r^2} = 4 \times 10^{-4} \frac{N}{C}$$

$$E_2 = \frac{q_2 \times 9 \times 14 \times 10^{-9}}{14 \times r^2} = 1.4 \times 10^{-4} \frac{N}{C}$$

$$1.4 \times 10^{-4} = \sqrt{(4 \times 10^{-4})^2 + E_{3r}^2} \Rightarrow 0.4 \times 10^{-4} = 1.4 \times 10^{-4} + E_{3r}^2$$

$$\Rightarrow E_{3r} = 1.0 \times 10^{-4} \text{ و } E_{3t} = 1.4 \times 10^{-4}$$

$$E_r = 1.4 \times 10^{-4} \leftarrow \text{مس}$$

$$\frac{4 \times 10^{-9} \times 2r}{14 \times r^2} = 1.4 \times 10^{-4} \Rightarrow 2r = \frac{1.4 \times 10^{-4} \times 14 \times r^2}{4 \times 10^{-9}} = \boxed{14 \mu C}$$

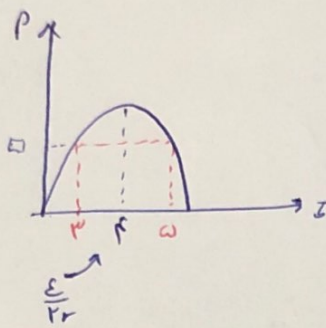
$$F_{12} = \frac{q_1 \times q_2 \times 9 \times 17 \times 10^{-9} \times 14 \times 10^{-9}}{40} = 1.4 \times 10^{-17} N = \boxed{1.4 \times 10^{-17} N}$$

$$C = \frac{k \epsilon A}{d}$$

$$C_1 = \frac{\epsilon \times 2 \times 10^{-6} \times 14 \times 10^{-10}}{2 \times 10^{-10}} = 1.4 \times 10^{-6} F$$

$$C_2 = \frac{\epsilon \times 2 \times 10^{-6} \times 14 \times 10^{-10}}{2 \times 10^{-10}} = 1.4 \times 10^{-6} F$$

$$C_2 - C_1 = 1.4 \times 10^{-6} - 1.4 \times 10^{-6} = \boxed{1.4 \times 10^{-6} F}$$



$$\frac{E}{4r} = \epsilon \Rightarrow E = 4r\epsilon$$

$$V = E - Ir = 0$$

$$\Rightarrow 4r - Ir = 0 \Rightarrow I = 4A$$

(۲) نتیجه

$$R_1, R_2 \rightarrow 2R \xrightarrow{\text{سری } R_3} \frac{2R}{3} \xrightarrow{\text{سری } R_4} \frac{4R}{3} \rightarrow R_T < \frac{4R}{3} \rightarrow \text{جواب (۳) و (۴)}$$

(۲۲۴)

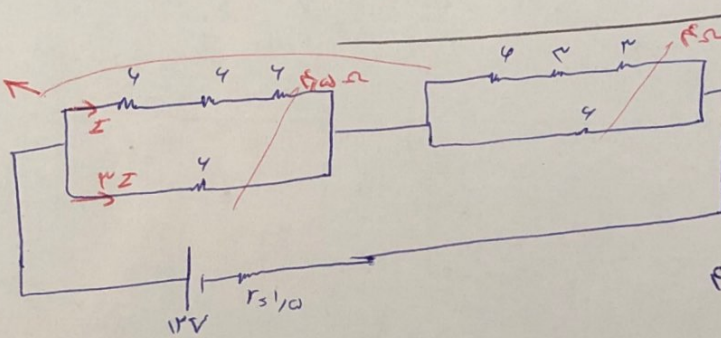
(۳) نتیجه

$$\frac{P_r}{P_0} = \frac{1}{4} \Rightarrow P_r = \frac{1}{4} P_0 \xrightarrow{P = \frac{V^2}{R}} \left(\frac{V}{R} \right)^2 = \frac{1}{4} \frac{V^2}{R_0} \Rightarrow \frac{V}{\epsilon R} = \frac{V}{R_0}$$

$$R_0 = \frac{\epsilon}{4} R \Rightarrow R_T = \frac{4R}{4} = \frac{\epsilon R}{4}$$

$$R_T = \frac{4}{4} R$$

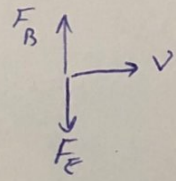
$$R_{\text{کل}} = 1.1 \Omega$$



$$I = \frac{E}{R+r} = \frac{12}{1.1+1.1} = 1.2A$$

$$\epsilon Z = 1.2 \Rightarrow Z = 0.3 \rightarrow \boxed{3Z = 0.9A}$$

(۲) نتیجه (۲۲۵)



$$F_B = 2VBSh\omega = 2 \times 1 \times 10^{-4} \times 2 \times 10^{-6} \times 2 \times 10^{-7} \times 1 = 0.1 \times 10^{-17}$$

$$F_E = E q = 200 \times 2 \times 10^{-4} = 10^{-10} \frac{N}{C}$$

$$F_T = 10^{-10} (1 - 0.1) = 0.9 \times 10^{-10} = \boxed{9 \times 10^{-11}}$$

(۳) نتیجه (۲۲۸)

$\phi \downarrow \Rightarrow$ در جهت B و B' $\Rightarrow$ در جهت افزایش پتانسیل

$$E = -\frac{\Delta\phi}{\Delta x} = \frac{-1 \times (-0.2)}{10^{-3}} = 200V$$

(۲۲۹)

(۲) نتیجه

علی امینی
علیرضا امینی

$$U = mgh \Rightarrow 2000 = 20 \times 10 \times h \Rightarrow h = 10 \text{ m}$$

$$K = \frac{1}{2} m v^2 = \frac{1}{2} \times 20 \times 45 = 450 \text{ J} \leftarrow \text{مقدار}$$

$$\rightarrow R_a = \frac{1400}{2000} = 0.7$$

$$E_{\text{موتور}} = 2000 \text{ J}$$

$$P = \rho g h + P_0$$

$$P = \rho \times 10 \times \frac{1}{\rho} + 102400 = \rho + 102400$$

$$P = 1.5 P \Rightarrow \rho \times 10 \times \frac{1}{1.5} + 102400 = 1.5 (\rho + 102400)$$

$$0.5 \rho + 102400 = 1.5 \rho + (1.5 \times 102400)$$

$$0.5 \rho = 0.5 \rho \Rightarrow \rho = 13.5 \frac{\text{g}}{\text{cm}^3}$$

$$P_{\text{بالا}} + \rho g h = \rho g h + P_0 \Rightarrow 10000 + 13.5 \times 10 \times \frac{1}{1.5} = \rho \times 10 \times \frac{1}{1.5} + 100000$$

$$10000 = 100000 + 90 \rho \Rightarrow 90 \rho = 90000$$

$$\rho = 1000 \frac{\text{kg}}{\text{m}^3}$$

$$\text{خطا } 0.1 \text{ mm} \leftarrow \text{درست } 2 \times 0.1 \text{ mm} \text{ به رسم است با رقم هجده}$$

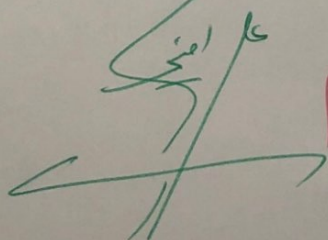
$$Q_{\text{در}} = m L_F + m C \Delta \theta = 500 (10 \text{ m} + 20 \text{ m})$$

$$Q_{\text{زیر}} = m L_F = 20 \times 10 \times 500$$

$$\frac{Q_{\text{زیر}}}{Q_{\text{در}}} = \frac{m \times 10 \times 500}{m \times 100 \times 500} = \frac{10}{100} = 0.1$$

$$H = \frac{K A \Delta \theta}{L} \rightarrow \frac{H_A}{H_B} = \frac{A_A}{A_B} \times \frac{L_B}{L_A} = \frac{5}{3} \times \frac{5}{3} = \frac{25}{9}$$

$$V_A = V_B \Rightarrow A_A L_A = A_B L_B \Rightarrow \frac{A_A}{A_B} = \frac{L_B}{L_A} = \frac{5}{3}$$



با ارز سرانجام و موفقیت داشته باشید عزیزم
علیرضا اصفی