

حل تشریحی کنکور تجربی 1400 دکترا محمد مهدی لوری

2.6) گزینه 4

$${}_{93}^{237}\text{NP} \longrightarrow 3 \binom{4}{2} + \binom{4}{-1} + \cancel{225}$$

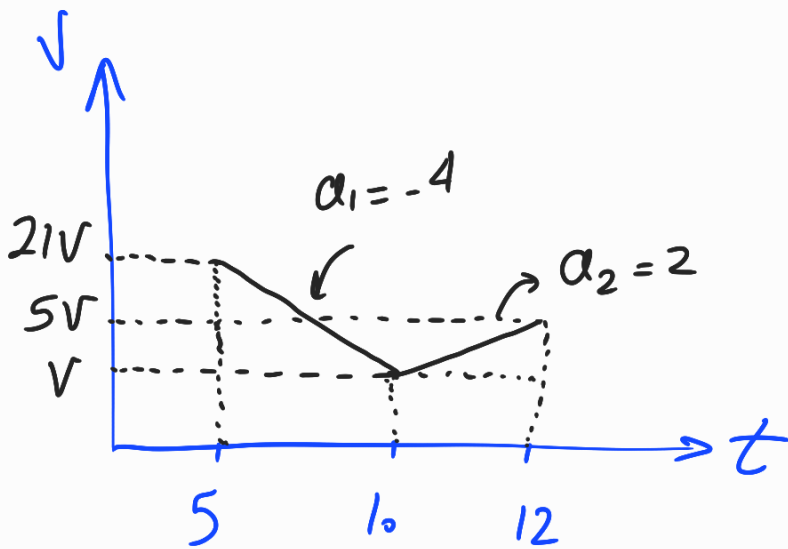
تعداد پروتون = 88 نوترون = 225 - 88 = 137

2.7) گزینه 3

تندی متوسط = $\frac{\Delta l}{\Delta t}$ ، نسبت مسافت به زمان در گزینه 3 از همه بتر است .

2.8) گزینه 4

در بازه t_1 تا t_2 ، شتاب مثبت و تندی در حال افزایش
 بزرگی شتاب یعنی شیب $(v-t)$ ، که اندازه شیب در لحظات t_2 و t_1 برابر است
 در بازه t_1 تا t_2 ، شتاب مثبت ، t_1 تا t_2 شتاب منفی است .



$$a_1 = \frac{\Delta v_1}{\Delta t_1}$$

$$-4 = \frac{-20V}{5}$$

$$v = 1 \text{ m/s}$$

$$a_{(5 \rightarrow 12)} = \frac{v_{12} - v_5}{7} = \frac{5V - 21V}{7} = \frac{-16V}{7} = -\frac{16}{7}$$

210 - گزینہ 3

$$v_A = \frac{(x_0)_A}{5}$$

$$v_B = \frac{-(x_0)_B}{2}$$

$$\Rightarrow v_A = 2v_B \Rightarrow \begin{cases} \frac{(x_0)_A}{5} = \frac{2(x_0)_B}{2} \\ \Delta x_0 = 15 \end{cases}$$

$$\Rightarrow (x_0)_A = -50 \text{ m}$$

$$(x_0)_B = 100$$

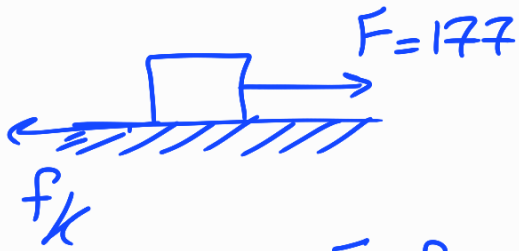
$$v_A = 10 \text{ m/s}$$

$$v_B = -5 \text{ m/s}$$

$$x_A|_{t=2} = 20(10) - 50 = 150$$

$$\Rightarrow \Delta x = 150 \text{ m}$$

$$x_B|_{t=2} = 0$$



$$a = \frac{\Delta v}{\Delta t} = \frac{3}{4} \text{ m/s}^2$$

$$F - f_k = ma \Rightarrow 177 - f_k = 36 \times \frac{3}{4}$$

$$f_k = 15 \text{ N}$$

$$F_N = 360 \Rightarrow F_R = \sqrt{F_N^2 + f_k^2} = \boxed{390 \text{ N}}$$

$$\text{حالت اول} \Rightarrow k \sin \alpha = mg \Rightarrow 200 \times 0,15 = 10 \text{ m}$$

$$m = 3 \text{ kg}$$

$$\text{حالت دوم} \Rightarrow mg = 30$$

$$mg < k \sin \alpha$$

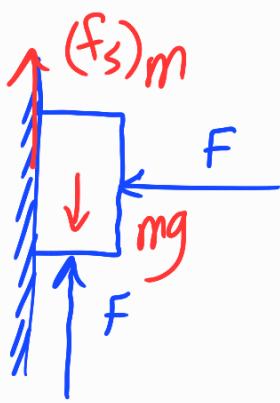
$$k \sin \alpha = 200 \times 0,1 = 20$$

س. < a

$$k \sin \alpha - mg = ma \Rightarrow 20 - 30 = 3a$$

$$a = -10/3 \text{ m/s}^2$$

حالت اول:

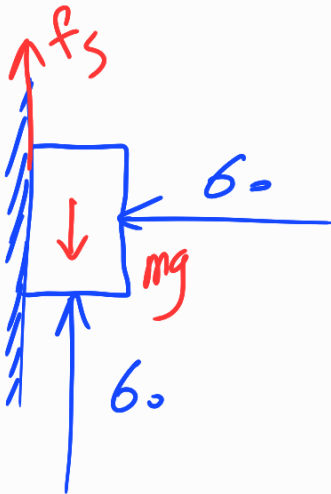


$$F_N = F$$

$$(f_s)_m = \mu_s F = 0.5 F$$

$$(F_{net})_y = 0 \Rightarrow +F - \underbrace{mg}_{4.0} - 0.5F = 0 \Rightarrow \underline{F = 8.0 N}$$

حالت دوم:



$$(F_{net})_y = 0$$

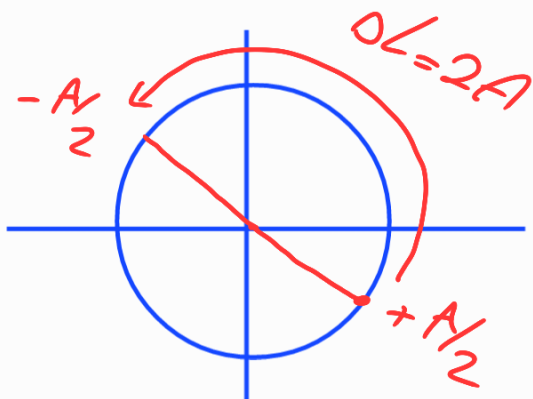
$$+6.0 - 4.0 - f_s = 0$$

$$\underline{f_s = 2.0 N}$$

$$F_R = \sqrt{8.0^2 + 4.0^2}$$

$$\Rightarrow \frac{F_{R'}}{F_R} = \frac{\sqrt{2}}{2}$$

$$F_{R'} = \sqrt{6.0^2 + 2.0^2}$$



$$\Delta t = \frac{T}{2} = 2 \Rightarrow T = 4$$

$$\omega = \frac{2\pi}{4} = \frac{\pi}{2}$$

$$E = \frac{1}{2} m A^2 \omega^2 = \frac{1}{2} \times 2 \times (-1.4)^2 \left(\frac{\pi}{2}\right)^2$$

$$\Rightarrow E = 0,4 \text{ J}$$

215 - نرسنه!

$$\frac{3\lambda}{2} = 450 \Rightarrow \lambda = 300 \text{ nm}$$

$$v = 3 \times 10^8$$

$$\Rightarrow \lambda = v \cdot T$$

$$\Rightarrow 300 \times 10^{-9} = 3 \times 10^8 \cdot T$$

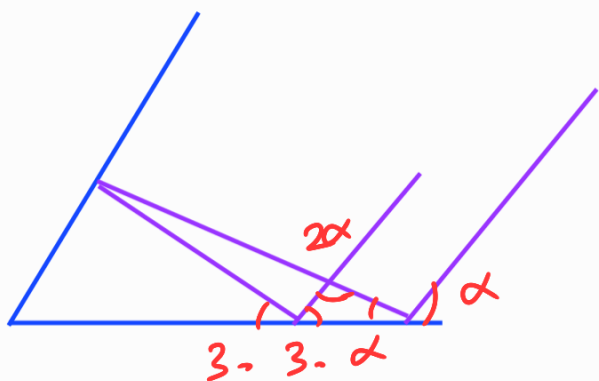
$$\Rightarrow T = 10^{-15} \text{ s}$$

$$\frac{5\lambda}{4} = 1.0 \text{ cm} \Rightarrow \lambda = 8 \text{ cm}$$

$$\lambda = v \cdot T \Rightarrow 1.0 \cdot 8 = 4T \Rightarrow T = \frac{2}{100} \text{ s}$$

$$\frac{\Delta t}{T} = \frac{1.25}{1/2} = \frac{25}{2} = 12.5 \Rightarrow \Delta t = 12.5T$$

$$\Delta L = 12.5(4A) = 50A \Rightarrow \bar{S} = \frac{50A}{1.25} = 6 \Rightarrow A = 3 \text{ cm}$$



زاویه انحراف 2α

$$2\alpha + \alpha + 30 = 180$$

$$\alpha = 50$$

برای کمترین انرژی، کمترین باید باشد که باید از $n=5$ به $n=4$ برود.

$$\Delta E = \frac{-13.6}{25} - \left(\frac{-13.6}{16} \right) = 1.36 \text{ eV}$$

$$\Delta E = hf \Rightarrow 1.36 = 4 \times 10^{-15} f \Rightarrow f = 76.5 \text{ THz}$$

$$\lambda = \frac{c}{f} = \frac{3 \times 10^8}{\frac{8}{3} \times 10^{15}} = \frac{900}{8} \text{ nm} \quad n' = 1$$

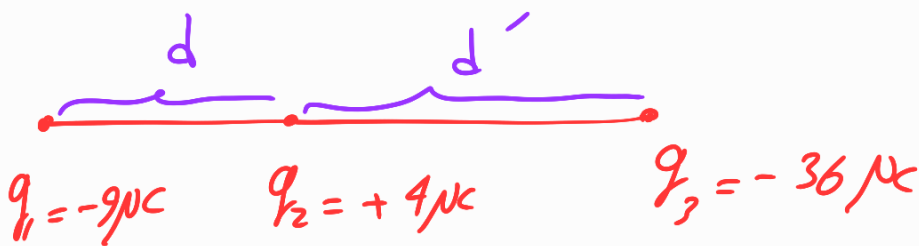
البتہ صبح کتاب دہی
باید $n' = 1$ دہی لہ

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

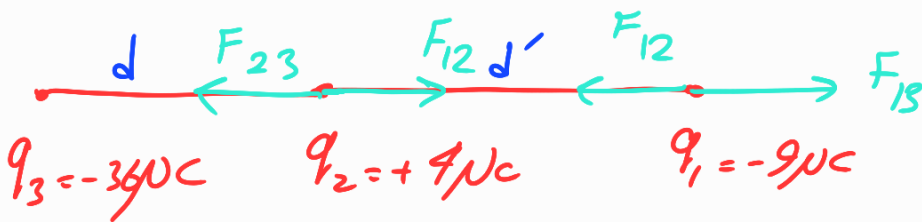
$$\frac{8}{900} = \frac{1}{100} \left(\frac{1}{1} - \frac{1}{n^2} \right) \Rightarrow \underline{n=3} \Rightarrow \underline{\text{دوسر}}$$

22 گزینہ 1

221 گزینہ 4



$$F_{12} = F_{32} \Rightarrow \frac{k q_1 q_2}{d^2} = \frac{k q_2 q_3}{d'^2} \Rightarrow \boxed{d' = 2d}$$



$$F_{12} = \frac{k q_1 q_2}{(2d)^2} = 9 \frac{k}{d^2}$$

$$\Rightarrow (F_T)_1 = 27 \frac{k}{d^2}$$

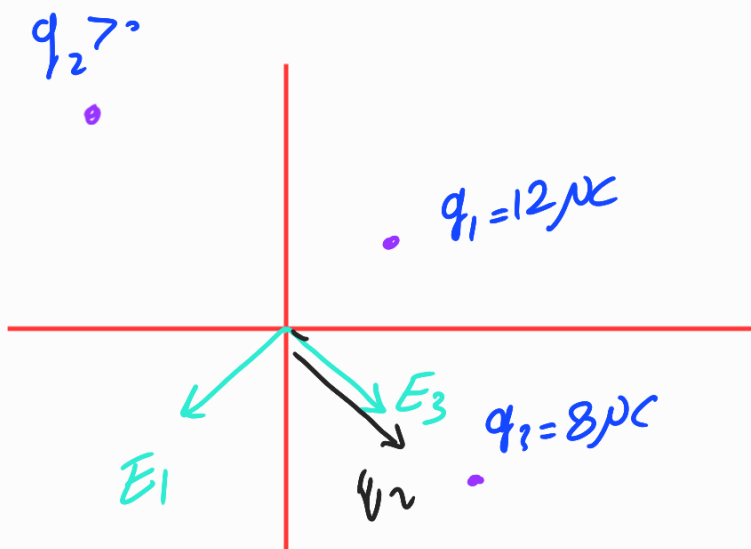
$$F_{13} = \frac{k q_1 q_3}{(3d)^2} = 36 \frac{k}{d^2}$$

$$F_{23} = \frac{kq_2 q_3}{d^2} = 144 \frac{k}{d^2}$$

$$\Rightarrow (F_T)_2 = 135 \frac{k}{d^2}$$

$$\frac{(F)_{T_2}}{(F)_{T_1}} = \frac{135}{27} = 5$$

222 - گزینہ 1



$$E_{23} = E_2 + E_3$$

$$E_T = \sqrt{(E_2 + E_3)^2 + E_1^2} \quad (1)$$

$$E_T = 7.5 \times 10^3$$

$$r_1 = 3\sqrt{2} \rightarrow E_1 = \frac{k \times 12 \times 10^{-6}}{18 \times 10^{-4}}$$

$$r_2 = 6\sqrt{2} \rightarrow E_2 = \frac{k q_2}{72 \times 10^{-4}}$$

$$r_3 = 4\sqrt{2} \rightarrow E_3 = \frac{k \times 8 \times 10^{-6}}{32 \times 10^{-4}}$$

$$\Rightarrow q = 18 \mu C$$

$$1, b (3, 3)$$

$$2, b (-6, 6)$$

$$r_{12} = \sqrt{(-6-3)^2 + (6-3)^2} = \sqrt{90}$$

$$\Rightarrow F_{12} = \frac{kq_1q_2}{r_{12}^2} = \frac{9 \times 10^{-9} \times 18 \times 10^{-6} \times 12 \times 10^{-6}}{(\sqrt{90})^2} = 2,16 \times 10^{-2} \text{ N}$$

223 / نرینه 1

$$C_2 - C_1 = k\epsilon_0 \frac{A}{d_2} - k\epsilon_0 \frac{A}{d_1} = k\epsilon_0 A \left(\frac{1}{d_2} - \frac{1}{d_1} \right)$$

$$\Rightarrow C_2 - C_1 = 4 \times 8,85 \times 10^{-12} \times 2 \times 10^{-4} \times \frac{3}{10} \times 10^{+3}$$

$$\underline{C_2 - C_1 = 2,124 \mu F}$$

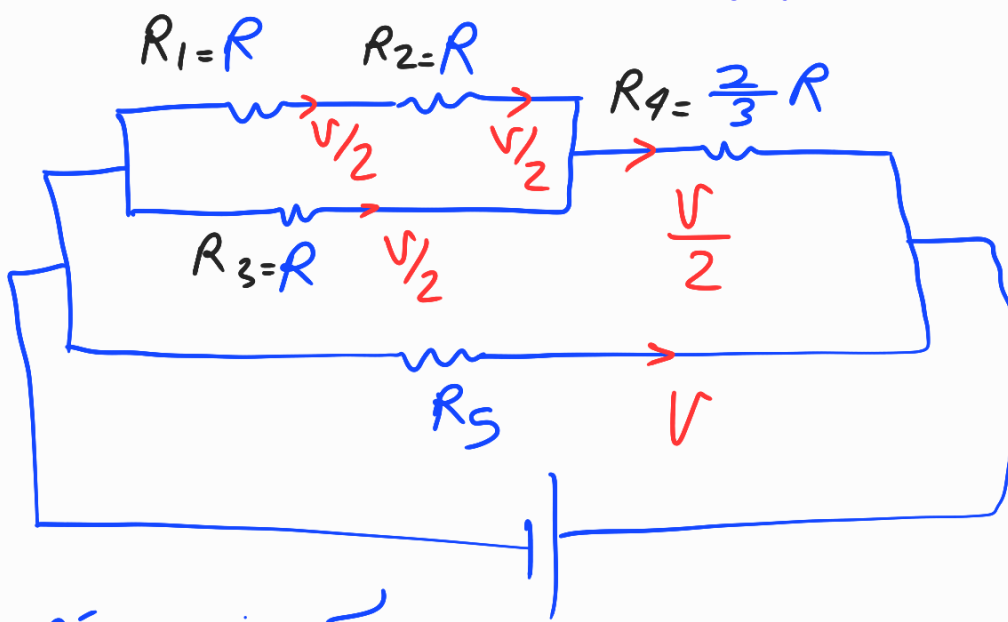
224 / نرینه 4 . حقیقی ها

225 / نرینه 4

اگر به ازای دو جریان توان میان شود I_{max} داره جاری دو جریان است.

$$I_m = \frac{3+5}{2} = 4A \quad , \quad I_m = \frac{\epsilon}{2r} = 4 \Rightarrow \underline{\epsilon = 8r}$$

$$V = \epsilon - IR = 0 \Rightarrow I = \frac{\epsilon}{r} = \frac{8r}{r} = \underline{8A}$$



$$R_{12} = 2R$$

$$R_3 = R$$

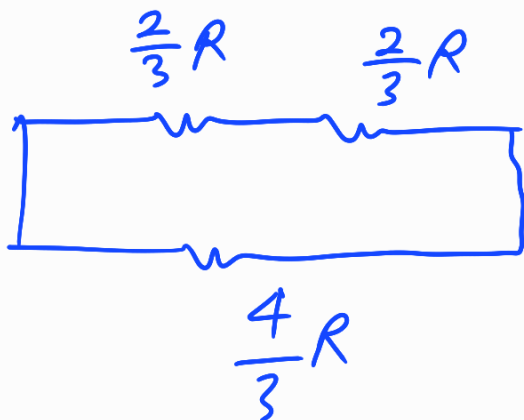
$$R_{123} = \frac{2R}{3}$$

معادست R_4 و R_{123} متوالی و جادی اند پس ولتاژ آنها نصف ولتاژ

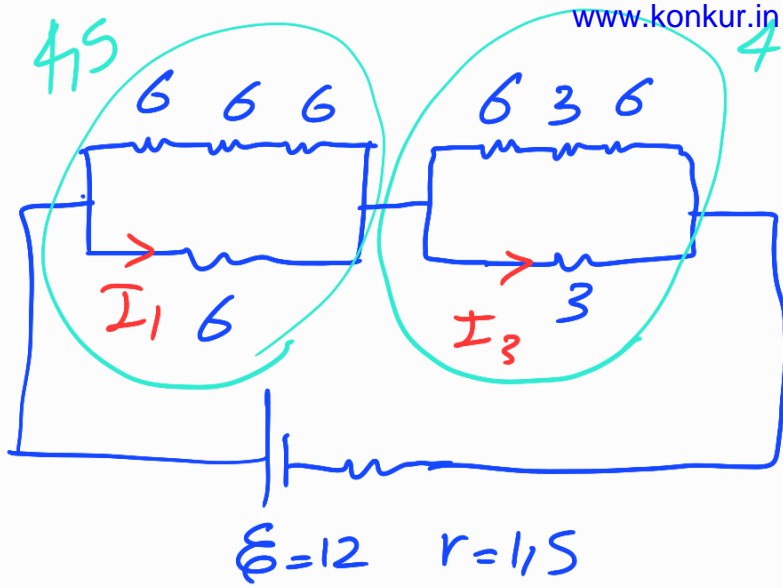
$$P_3 = \frac{1}{3} P_5 \Rightarrow \frac{\frac{V^2}{4}}{R} = \frac{1}{3} \frac{V^2}{R_5}$$

اعلی است .

$$\Rightarrow R_5 = \frac{4}{3} R$$



$$\Rightarrow R_{eq} = \frac{2R}{3}$$



$$R_{eq} = 4 + 4/5 = 8/5$$

$$I = \frac{12}{8/5 + 1/5} = 1/2$$

$$I_1 = \frac{18}{24} \times 1/2 = \underline{0.375 A}$$

$$F_B = qvB \quad \uparrow$$

$$F_E = Eq \quad \downarrow$$

$$F_{net} = F_B - F_E$$

$$= q(vB - E)$$

$$= 2 \times 10^{-6} (2 \times 10^4 \times 0.2 - 500)$$

$$\Rightarrow \underline{F_{net} = 2 \times 10^{-4} N}$$

$$\mathcal{E} = -N \frac{\Delta\Phi}{\Delta t} = -1 \times \frac{(-0.2)}{10^{-3}} = \boxed{2.0 \text{ V}}$$

شارد در حال کاهش است یعنی ترمز باید میدان القای زیاد شود پس میدان القای نیز باید بدون سو بارندگی به سمت مخالف دست راست جریان القای ماعتد است.

$$E_1 = U_1 = 2000$$

$$E_2 = k_2 = \frac{1}{2} m v^2 = \frac{1}{2} \times 50 \times 64 = 1600 \text{ J}$$

$$\Rightarrow P_a = \frac{1600}{2000} = 80 \%$$

$$P_2 = 1.5 P_1 \Rightarrow P_0 + \rho g h_2 = 1.5 (\rho g h_1 + P_0)$$

$$\Rightarrow \rho g (1.5 h_1 - h_2) = 0.5 P_0$$

$$h_1 = 10 \text{ cm}$$

$$h_2 = 53 \text{ cm}$$

$$\Rightarrow \rho = 13.5 \text{ gr/cm}^3$$

$$P_0 = 1.26 \times 10^5 \text{ Pa}$$

232 : گزینہ 3

$$P_0 + \rho g h_1 - \rho g h_2 = P \text{ معین}$$

$$10^5 + \rho \times 10 \times 0.36 - 13600 \times 10 \times 0.2 = 80 \times 10^3$$

$$\rho = 2000 \text{ kg/m}^3$$

233 : گزینہ 1

$$\frac{Q_1}{Q_2} = \frac{mL_F}{mL_F + mCO\theta} = \frac{336000}{336000 + 4200 \times 20} = 0.8$$

$$= 80\%$$

234 :
گزینہ 2

$$m_A = m_B \Rightarrow A_A L_A = A_B L_B$$

$$\left. \begin{array}{l} L_A = \frac{3}{4} L_B \\ A_B = \frac{3}{4} A_A \end{array} \right\}$$

235 : گزینہ 4

$$\frac{H_A}{H_B} = \frac{A_A}{A_B} \times \frac{L_B}{L_A} = \frac{4}{3} \times \frac{4}{3} = \frac{16}{9}$$