

10

1) 14) ①

$$17) I = \sqrt{5m} (\sqrt{50T} \times \sqrt{2} \times 10^{-3}) = \sqrt{5m} \frac{T}{\sqrt{2}} = 1A \text{ ②}$$

18) ②

19) ②

$$20) h = \frac{1}{19} R_e \Rightarrow r = R_e + h = \frac{10}{19} R_e$$

$$W' = m \times g' = m \times \left(\frac{14}{19} \right) g = 10 \times \frac{14 \times 14}{19 \times 19} \times 10 = 1.05 N \text{ ②}$$

$$21) a = \frac{\Delta v}{\Delta t} = \frac{0 - 10}{1} = -10 \text{ m/s}^2$$

$$F_{\text{net}} = m \times a = 1 \times (-10) = -10 N \Rightarrow |F_{\text{net}}| = 10 N \text{ ②}$$

$$22) \frac{I_c}{I_1} = \left(\frac{r_1}{r_2} \right)^2 \Rightarrow \frac{I_c}{1} = \left(\frac{4 \epsilon_0}{14_0} \right)^2 \Rightarrow \frac{I}{r} = 1.9 W/m^2 \text{ ②}$$

$$23) \lambda = v \times T \quad \Delta t = 10/5 = \frac{T}{f} \Rightarrow L = 1A$$

$$v = 10 \times T$$

$$T = \frac{1}{10} S$$

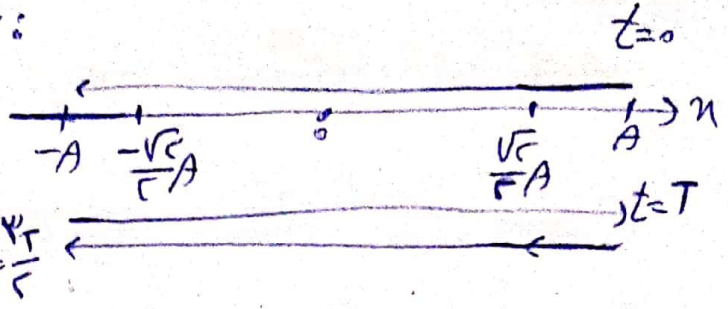
$$L = 1 \lambda \text{ } \Delta t = 10 \text{ cm}$$

②

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با توجه به این شکل:

۸۵) $T = \frac{v\lambda}{v\lambda} = \frac{1}{\nu} s$



$\Delta t = \gamma \Delta s = \frac{v}{c} T$

$|V_{av}|_{max} = ? = \frac{|\Delta x|}{\Delta t} = \frac{vA}{\frac{v}{c} T} = \frac{v \times 2cm}{\frac{v}{c} T} = 1 cm/s$

۸۸) $\Delta t = 1T \Rightarrow \sum_{av} = 2v cm/s$

$L = (vA) \frac{vA}{c} = 2v$
 $\frac{vA}{c} = 2v$
 $A = 2cm$

$\frac{T}{c} = \frac{1}{\nu} \Rightarrow T = \frac{1}{\nu} s$

$(2, \frac{v}{c}) s \Rightarrow \Delta t = \frac{v}{c} s = \frac{vT}{c} \Rightarrow |\Delta x| = vA = 4cm$

۸۹) $N = \frac{N_0}{\gamma^n} \Rightarrow \frac{N_0}{\gamma^n} = \frac{N_0}{\gamma^n} \Rightarrow \gamma^n = \gamma \Rightarrow \gamma = \sqrt{2} \Rightarrow \gamma = \frac{1}{\sqrt{1-\beta^2}} = \sqrt{2}$
 $\frac{T}{\gamma} = 1 day$

۹۰) $hf = E_2 \times 10^{-18} \times 1,000 \times 10^{18} = 1,07 eV$

$E_2 - E_1 = 1,07 eV$

μ

dA) $n = r$, $n = d$, $q_1 V$, ...

$$\frac{1}{\lambda} = R \left(\frac{1}{n_1 r} - \frac{1}{n_2 r} \right) = R \left(\frac{1}{14} - \frac{1}{19} \right) = R \frac{\mu}{14 \times 19}$$

$$\lambda = \frac{14 \times 19}{\mu R} = \frac{14 \times 19 \times 10^8}{\mu c} \approx 22.74 \text{ nm}$$

(5)

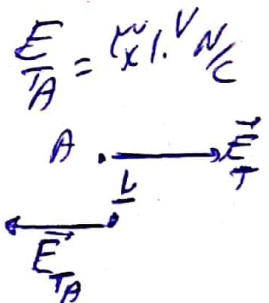
d9) $F_{\mu} = 0 \Rightarrow$ ^{due to} q_1 & q_2

$$F_{\mu} = F_{\mu c} \Rightarrow \frac{|q_1|}{d^2} = \frac{|q_2|}{\epsilon d^2} \Rightarrow \left| \frac{q_2}{q_1} \right| = \frac{\epsilon}{9} \Rightarrow \frac{q_2}{q_1} = \frac{-\epsilon}{9}$$

(5)

4.) Answer: $E_1 = \frac{q_1 \times 10^{-9} / 1 \times 10^{-9}}{4 \times 10^{-8}} = 2 \times 10^6 \text{ N/C}$

$$E_2 = \frac{q_2 \times 10^{-9} \times 1 \times 10^{-9}}{4 \times 10^{-8}} = 2 \times 10^6 \text{ N/C}$$



\Rightarrow $\vec{E}_1 + \vec{E}_2 \Rightarrow E = 2 \times 10^6 + 2 \times 10^6 = 4 \times 10^6 \text{ N/C}$

Answer: $E_c = 2 \times 10^6 \text{ N/C} \Rightarrow \frac{q_1 \times 10^{-9} / 1 \times 10^{-9}}{4 \times 10^{-8}} = 2 \times 10^6$

$$|q_1| = 1 \times 10^{-9} \text{ C} \Rightarrow q_1 = -1 \mu\text{C}$$

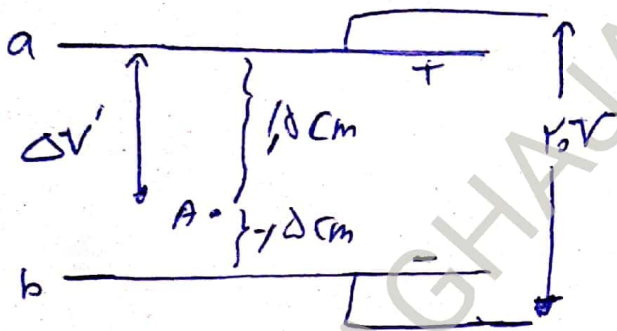
$$\rightarrow E_2 = 1 \times 10^6 \text{ N/C} \Rightarrow |q_2| = 1 \mu\text{C} \Rightarrow q_2 = -1 \mu\text{C}$$

(5)

سوال

$$41) E = \text{con.} \Rightarrow \frac{|\Delta V|}{d} = \frac{|\Delta V'|}{d'} \Rightarrow \frac{V_0 V}{V_{cm}} = \frac{|\Delta V'|}{10 \text{ cm}}$$

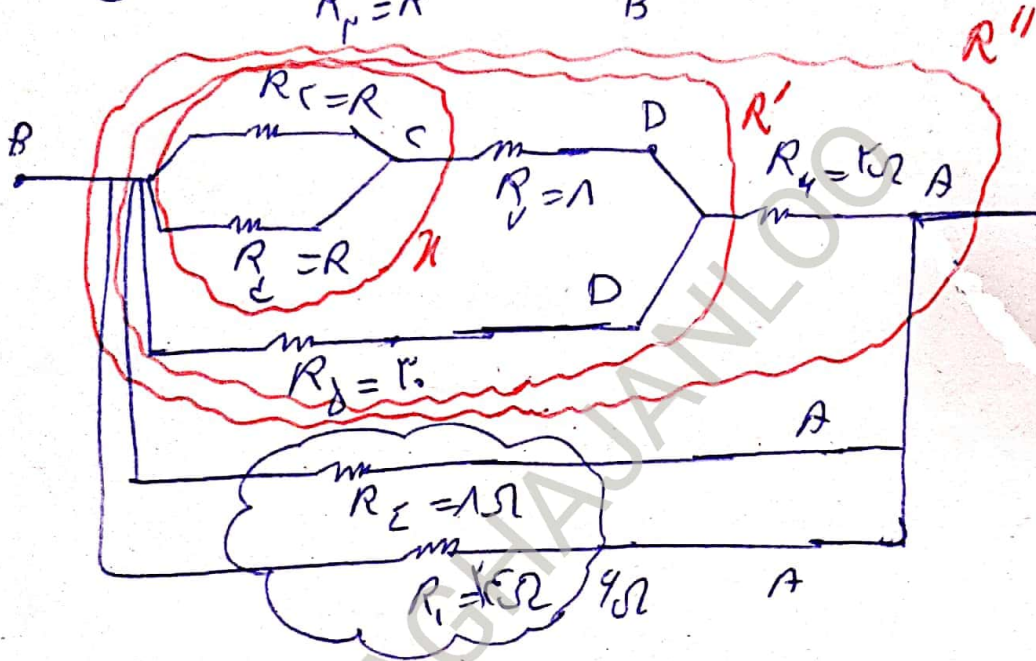
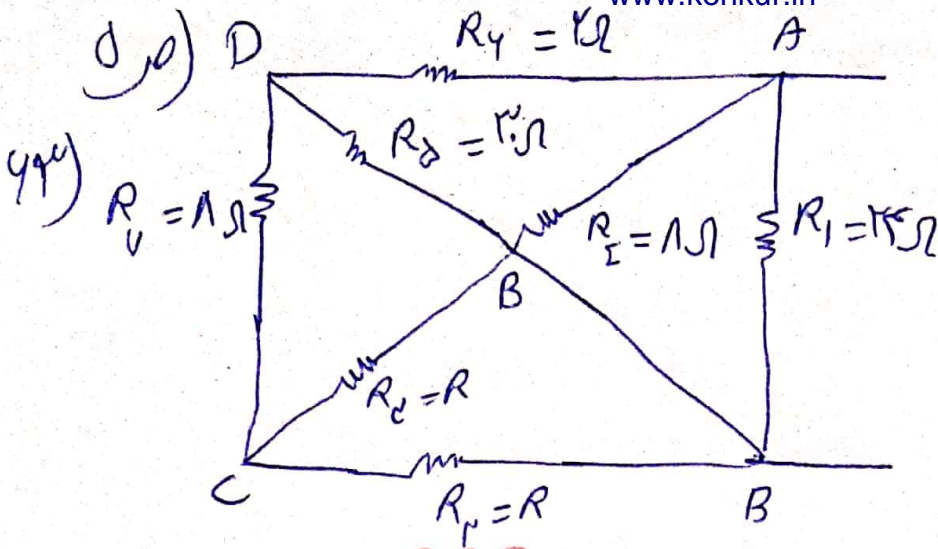
$$|\Delta V'| = 10 V$$



$$\begin{aligned} |\Delta U| &= |q \times |\Delta V|| \\ &= 0.1 \times 10^{-6} \times 10 \\ &= 10^{-6} \text{ J} \\ &= 1 \mu\text{mJ} \end{aligned}$$

$$\Delta U = -1 \mu\text{mJ} \quad \text{Ⓢ}$$

$$42) R = \frac{\rho L}{A} = \frac{10^{-17} \times 10^{-1}}{10^{-10}} = 1 \Omega \quad \text{Ⓢ}$$



$$V = E - I \cdot R$$

$$1V = 1A - I \times 1 \Rightarrow I = 1A$$

$$I = \frac{E}{R_{eq} + r} \Rightarrow r = \frac{1A}{R_{eq} + 1}$$

$$R_{eq} = 5\Omega$$

$$\frac{4R''}{4 + R''} = 1 \Rightarrow R'' = 1\Omega$$

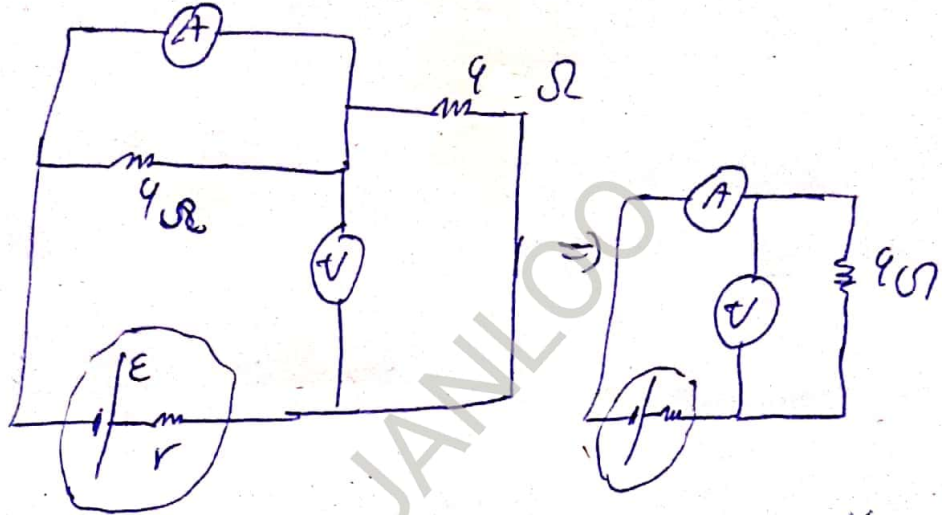
$$R' = 1\Omega \Rightarrow R = 1\Omega \Rightarrow \underline{R = 1\Omega} \quad \text{D}$$

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۴۴) در حالت اول : $I = \frac{\mathcal{E}}{4 + r}$...

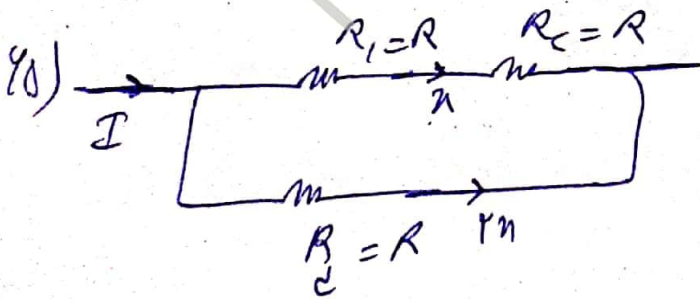
عدد ولت سنج = $\begin{cases} I \times 4 \\ \mathcal{E} - I \times r \end{cases}$

(در حالت دوم)



عدد ولت سنج = $I = \frac{\mathcal{E} = 2\mathcal{E}}{4 + r}$ ✓

عدد ولت سنج = $I \times 4$ (۳)



$P = RI^2$
 $P_1 = R I^2$
 $P_2 = R I^2$
 $P_r = R \times (2I)^2 = 4P_1 = 4P_2$
 (۱)

✓✓)

$$94) \frac{\Delta A}{\Delta t} = 1 \times 10^{-7} \frac{m^2}{s}$$

$$B = -\mu_0 T$$

$$\mathcal{E} = -N \frac{\Delta \phi}{\Delta t}$$

$$= -N \cdot B \cdot \cos \theta \cdot \frac{\Delta A}{\Delta t}$$

$$= -1 \times \frac{1}{\epsilon} \times 1 \times 1 \times 10^{-7}$$

$$= -1 \cdot 10^{-7} \text{ V} \Rightarrow |\mathcal{E}| = 1 \text{ mV}$$



$$95) P_{gas_B} = P_0 + \rho \cdot g \cdot h$$

$$P_{gas_A} = P_{gas_B} + \rho \cdot g \cdot h = P_0 + \rho \cdot g \cdot h$$

$$112 \times 10^3 = 100 \times 10^3 + \rho \cdot 14 \Rightarrow \rho = \frac{12}{14} \times 10^3 \text{ kg/m}^3$$

$$\rho = 1200 \frac{kg}{lit}$$

$$96) W_T = \Delta K$$

$$1120 \times 10^3 = \frac{1}{2} \times 1000 \cdot (v_B^2 - 10^4) \Rightarrow v_B = 10 \frac{m}{s} = 10 \frac{km}{h}$$



10

$$99) \Delta L = \alpha \cdot L \cdot \Delta \theta$$

$$= 1,5 \times 10^{-5} \times 20 \times 10 = 1,5 \times 10^{-4} \times 20 = 3 \times 10^{-4} \text{ m} = 0,3 \text{ mm}$$

(5)

$$10.) Q = m \cdot c \cdot \Delta \theta + m \cdot L + m \cdot c_f \cdot \Delta \theta_f$$

$$= m \left(\frac{1}{2} c_f \times 10 + 1 \cdot c_f + 10 \cdot c_f \right)$$

$$= m \times 190 c_f = 10 \times 19 \times 57 = 1099 \text{ KJ}$$

(10)

9

V1) $a = \text{con.} = a_{av}$

$t_1 = 0 \Rightarrow V_0 = 1 \text{ m/s} \Rightarrow a = a_{av} = \frac{\Delta V}{\Delta t} = \frac{-1}{0} = -1 \text{ m/s}^2$

$t_f = 0.5 \Rightarrow V = -1 \text{ m/s}$

$V = at + V_0 \Rightarrow V = -1t + 1$

$t = 1.05 \Rightarrow V = 0$

(0, 1.05) s: $V < 0 \Rightarrow L = |\Delta x| \Rightarrow S_{av} = |V_{av}|$

$V_{av} = -1 \left(\frac{0+1.05}{2} \right) + 1 = -0.525 \text{ m/s} \Rightarrow |V_{av}| = 0.525 \text{ m/s}$

$\Rightarrow S_{av} = 0.525 \text{ m}$

V2) $t_1 = 1.5 \Rightarrow V_1 = 14 \text{ m/s} \Rightarrow a_{av} = \frac{\Delta V}{\Delta t} = \frac{14-19}{1.5-1} = 1 \text{ m/s}^2$

$t_f = 1.5 \Rightarrow V_f = 11 \text{ m/s}$

1) 5

V3) $t = 5 \text{ s} \Rightarrow \begin{cases} x = 1 \text{ m} \\ v = 0 \end{cases}$

$a = \text{con.}$

(0, 4) s: $\Delta x = -4 \text{ m}$

$x = 0 \Rightarrow |v| = ?$

$\Delta x = \frac{1}{2} a (t_n - 1) + V_0$

$-4 = \frac{1}{2} a (5 - 1) + V_0$

$-4 = 2a + V_0$

$V = at + V_0 \Rightarrow 0 = a(5) + V_0$

$\Rightarrow a = -1 \text{ m/s}^2$

$V_f - V_0 = a(\Delta t)$

$V_f - 0 = 1(-1)(0-1) \Rightarrow V = \pm 1 \text{ m/s}$

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

1) 5

سر

۱۴)

$$x = -2t^2 + 10t - 11$$

$$= -2(t^2 - 5t + 5.5)$$

$$v = -4t + 10$$

$$= -2(t-1)(t-5)$$

t(s)	0	1	5	∞		
x	-	0	+	+	0	-
v	+	+	0	-	-	-

(۲, ۵, ۴)س

$$\left. \begin{array}{l} x_1 = 2x/dx/dt \\ x_2 = 0 \end{array} \right\} \Rightarrow \vec{v} = \frac{\Delta x}{\Delta t} = \frac{0 - 2x/dx/dt}{5 - 1}$$

$$\vec{v}_{av} = - \frac{2x/dx/dt}{4}$$

$$\vec{v}_{av} = -2 \vec{v} \quad \text{②}$$

۱۵) ③ سر