FİZİK II CEVAP ANAHTARI

① Elektrik alan çizgilerinin yoğun olduğu yer E'nin büyük olması demek olduğundan; şekilden

$A > B > C$; $\boxed{E_A > E_B > E_C}$

$$U = k\left[\frac{29\,39}{0.4} + \frac{2q(-2q)}{0.4472} + \frac{29\,q}{0.2} + \frac{-2q\,q}{0.4}\right]$$

$$\frac{39(-2q)}{0.2} + \frac{39\,q}{0.4472}$$

$$U = k\,q^2\left[\frac{6}{0.4} - \frac{4}{0.4472} + \frac{2}{0.2} - \frac{2}{0.4} - \frac{6}{0.2} + \frac{3}{0.4}\right]$$

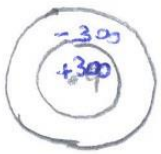
② 

$q_1 = +300nC$ $\quad q_2 = -500nC$

a) $\oint \vec{E}.d\vec{A} = \frac{q_{net}}{\varepsilon_0}$

$E\,4\pi r^2 = \frac{q_1}{\varepsilon_0} \Rightarrow E = \frac{1}{4\pi\varepsilon_0}\frac{q_1}{r^2}$

$$E = 9\times10^9\ \frac{300\times10^{-9}C}{(0.6m)^2} = 7500\ N/C$$

b) 

iletken oldığında merkezdeki +300nC yükü iç küresin yüzeyinde -300nC yük indükler. Gauss küresi içinde toplam yük $q_{net} = +300nC - 300nC = 0$

$\boxed{E=0}$ olur.

c) Küre dışında $q_{net} = -500nC + 300nC$

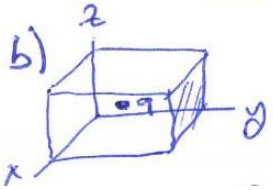
$q_{net} = -200nC$

$$E = \frac{1}{4\pi\varepsilon_0}\frac{q_{net}}{r^2} = 9\times10^9\frac{[-200\times10^{-9}C]}{(1.5m)^2} = -800\,N/C$$

③ Elektriksel akı $\Phi_E = \oint EA = \frac{q_{net}}{\varepsilon_0}$

$\Phi = [(-3\times10^{-3}C) + (2\times10^{-3}C)]/(8.85\times10^{-12})\ C^2/Nm^2$

$\Phi = -1.13\times10^8 Nm^2/C$

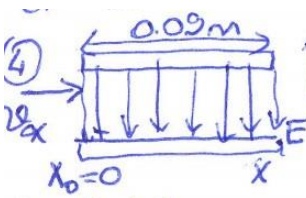
b) 

Akı $\Phi_E = \frac{q_{net}}{\varepsilon_0}$

Bir yüzeyden geçen akı ise

$\Phi/6 = q_{iç}/6\varepsilon_0 = (5\times10^{-6})/(6\times8.85\times10^{-12})$

$= 9.4\times10^4\ Nm^2/C$

④ 

$a_y = -qE/m$

$a_y = -1.6\times10^{-19}\times138/(9.11\times10^{-31})$

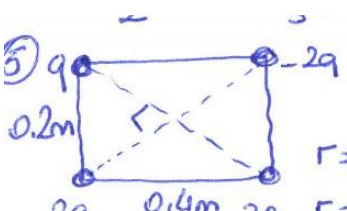
$a_y = -24.24\times10^{12}\ m/s^2$

b) Elektrona yatayda etkiyen bir kuvvet yoktur. $x = x_0 + v_{0x}t + \frac{1}{2}a_x t^2$ $\quad a_x = 0$, $x_0 = 0$

$x = v_{0x}t \Rightarrow t = \frac{x}{v_{0x}} = \frac{0.09m}{3\times10^6 m/s} = 3\times10^{-8}s$

c) $y = y_0 + v_{0y}t + \frac{1}{2}a_y t^2 = 0 + 0 + \frac{1}{2}a_y t^2$

$y = (1/2)\times(-24.24\times10^{12})\times(3\times10^{-8})^2 = -109.08\times10^{-4}m$, yani cisim düşüştedir.

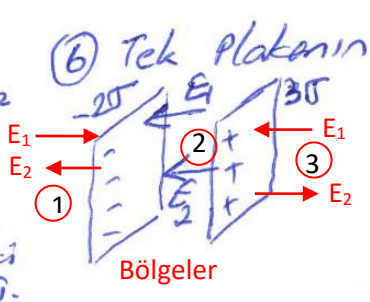
⑤ 

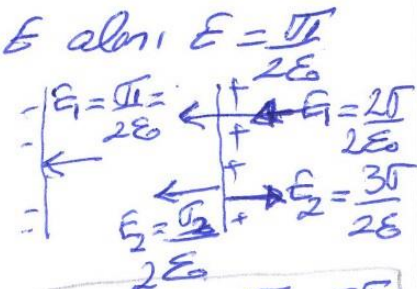
Elektriksel potansiyel enerji $U = \sum_{i=1} \frac{1}{4\pi\varepsilon_0}\frac{q_i q_j}{r_{ij}}$

$r = \sqrt{0.2^2 + 0.4^2}$

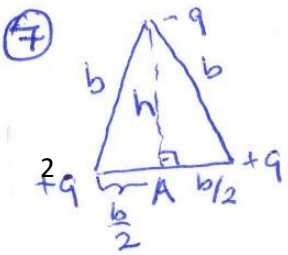
$r = 0.4472m$

⑥ Tek Plakanın E alanı $E = \frac{\sigma}{2\varepsilon_0}$





A ve B şıkkı: 1.bölgede toplam elektrik alan büyüklüğü $|E_T| = E2 - E1 = (3\sigma/2\varepsilon_0) - (2\sigma/2\varepsilon_0) = \sigma/2\varepsilon_0$ iken yönü sol dışarıdır. 3.bölgede ise, yön sağ dışarı ve aynı büyüklüktedir. 2.bölgede ise $|E_T| = E2 - E1 = (3\sigma/2\varepsilon_0) + (2\sigma/2\varepsilon_0) = 5\sigma/2\varepsilon_0$ ve yönü şekildeki gibi sola doğrudur.

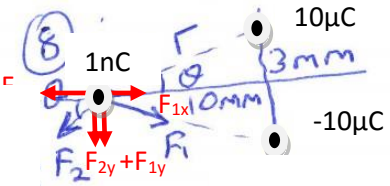
⑦ 

$h = \sqrt{b^2 - (\frac{b}{2})^2} = b\frac{\sqrt{3}}{2}$

$V_A = k\frac{q}{(b/2)} + k\frac{q}{(b/2)} - \frac{kq}{b\sqrt{3}/2}$

$V_A = \frac{kq}{b}\left[2 + 2 - \frac{2}{\sqrt{3}}\right]$

$V_A = \frac{kq}{b}\left[4 - \frac{2}{\sqrt{3}}\right]$

⑧ 

$\vec{F}_{net} = \vec{F}_1 + \vec{F}_2$

$(F_{net})_x = 0$

$q_2 = q_3 = 10\mu C$ ve $q_1 = 1nC$

$\sin\theta = 3/(109)^{1/2}$

$F_{net\,y} = [k.q_1.q_2/r^2].\sin\theta + [k.q_1.q_3/r^2].\sin\theta$

$F_{net\,y} = [k.q_1.\sin\theta/r^2] \times [q_2 + q_3]$

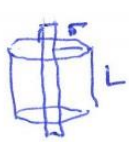
$F_{net\,y} = [8.99\times10^9 \times 10^{-9} \times [3/(109)^{1/2}]/(109\times10^{-6})]\times$

$[(10\times10^{-6}) + (10\times10^{-6})] = 4.95$ Newton

⑨ $V = 10 - 7x$

$E_x = -\frac{dV}{dx} = -\frac{d}{dx}(10 - 7x) = +7$ $\quad \sin\theta$

$+x$ yönünde

⑩ 

$\oint E.dA = \frac{q}{\varepsilon_0}$ $\quad \lambda = \frac{q}{L}$

$E\,2\pi rL = \lambda L$

$\boxed{E = 2k\frac{\lambda}{r}} \Rightarrow$ (D) şıkkı

⑪ iletken olduğundan (E) şıkkı