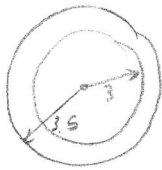


PHY 1304 Test #2

1-)



$$\oint \vec{B} \cdot d\vec{s} = \mu_0 I_{enc}$$

a) $r = 2 \text{ cm}$ $B 2\pi r = \mu_0 \cdot 0 \Rightarrow \boxed{B = 0}$

b) $r = 4 \text{ cm}$ $B 2\pi r = \mu_0 I$

$$B = \frac{\mu_0 I}{2\pi r} \Rightarrow \boxed{B = 5 \times 10^{-7} \text{ T}}$$

2-) $P = V \cdot I \Rightarrow I = \frac{600}{120} \Rightarrow \boxed{I = 5 \text{ A}}$

$$R = \frac{V}{I} = \frac{120}{5} \Rightarrow \boxed{R = 24 \Omega}$$

3-)



$$\mathcal{E} = - \frac{\Delta \Phi_B}{\Delta t}$$

$$\Phi_B = \int \vec{B} \cdot d\vec{a} = \vec{B} \cdot \vec{A} = BA \cos \theta$$

$$\Delta \Phi_B = \Phi_{Bf} - \Phi_{Bi}$$

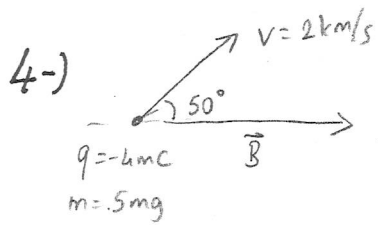
$$\Phi_{Bi} = BA \cos 0^\circ = BA$$

$$\Phi_{Bf} = BA \cos 180^\circ = -BA$$

$$\Delta \Phi_B = -2BA$$

$$\mathcal{E} = - \frac{(-2BA)}{\Delta t} = \frac{2 \times 0,1 \times (\pi \cdot 0,05^2)}{0,1} \Rightarrow \boxed{\mathcal{E} = 0,0157 \text{ V}}$$

$$I = \frac{\mathcal{E}}{R} = \frac{0,0157}{10} \Rightarrow \boxed{I = 0,00157 \text{ A}} = I = 1,57 \times 10^{-3}$$

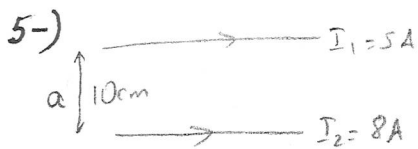


$$F_{mag} = q(\vec{v} \times \vec{B}) = ma$$

$$qvB \sin \theta = ma$$

$$B = \frac{ma}{qv \sin \theta} = \frac{(5 \cdot 10^{-6}) \cdot (5 \cdot 8)}{(4 \cdot 10^{-3}) (2 \cdot 10^3) \sin 50}$$

$$B = 4,73 \times 10^{-6} T$$



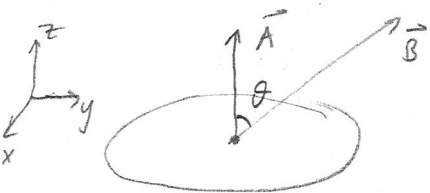
a) $B_1 = \frac{\mu_0 I_1}{2\pi a} = \frac{\mu_0 \cdot 5}{2\pi \cdot 0,1} \Rightarrow B_1 = 1 \times 10^{-5} T$

b) $\frac{F_{1on2}}{l} = \frac{\mu_0 I_1 I_2}{2\pi a} = \frac{\mu_0 \cdot 5 \cdot 8}{2\pi \cdot 0,1} \Rightarrow \frac{F_{1on2}}{l} = 8 \times 10^{-5} T$

c) $B_2 = \frac{\mu_0 I_2}{2\pi a} = \frac{\mu_0 \cdot 8}{2\pi \cdot 0,1} \Rightarrow B_2 = 1,6 \times 10^{-5} T$

d) $\frac{F_{2on1}}{l} = \frac{\mu_0 I_1 I_2}{2\pi a} = \frac{\mu_0 \cdot 5 \cdot 8}{2\pi \cdot 0,1} \Rightarrow \frac{F_{2on1}}{l} = 8 \times 10^{-5} T$

6-)



$$\Phi_B = \int \vec{B} \cdot d\vec{a} = B \cdot A = BA \cos \theta$$

$$\Phi_B = 0,25 \cdot (\pi \cdot 0,1^2) \cdot \cos 41$$

$$\Phi_B = 5,92 \times 10^{-3} T \cdot m^2$$