① $\mathcal{E} = vBL$

$= (33.\bar{3}\ m/s)(5\times10^{-6}\ T)(1.0\ m)$

$= 1.\bar{6}\times10^{-4}\ V$

$\boxed{\mathcal{E} = 0.17\ mV}$

② $\mathcal{E} = vBL$

$= (236.\bar{7}\ m/s)(1.75\times10^{-5}\ T)(47.65\ m)$

$= 0.197\ V$

$\boxed{\mathcal{E} = 0.20\ V}$

③ $v_f^2 = v_i^2 + 2ad$

$= 0 + 2(9.8)(10)$

$v_f^2 = 196$

$v_f = 14\ m/s$

$\mathcal{E} = vBL$

$= (14\ m/s)(3.8\times10^{-5}\ T)(1.0\ m)$

$= 5.32\times10^{-4}\ V$

$\boxed{\mathcal{E} = 0.53\ mV}$

④ $\mathcal{E} = -N\dfrac{\Delta\Phi}{\Delta t}$

$= -N\dfrac{(BA\cos\phi - B_0A\cos\phi)}{\Delta t}$

$= -\dfrac{NA\cos\phi\ (B-B_0)}{\Delta t}$

$= -\dfrac{(100)\pi(0.095)^2\cos 0\ (0-1.0)}{16}$

$\boxed{\mathcal{E} = 0.11\ V}$

⑤ $\mathcal{E} = -\frac{\Delta \Phi}{\Delta t}$

$= -\frac{(BA\cos\phi - B_0 A\cos\phi)}{\Delta t}$

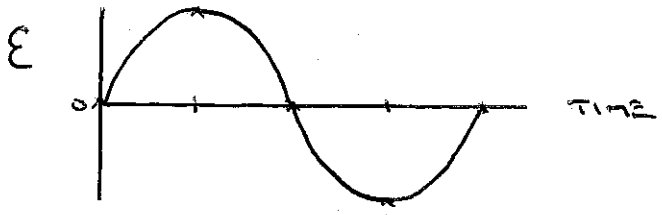
$= -\frac{A\cos\phi\,(B - B_0)}{\Delta t}$

$= -\frac{(0.0039)\cos(0)\,(9.3\times10^{-3} - 6.5\times10^{-3})}{0.5\,s}$

$= -2.1\times10^{-5}\ V$

$\boxed{\mathcal{E} = 21\ \mu V}$

⑥ AN AC CURRENT WILL BE INDUCED IN THE LOOP.



⑦ $\mathcal{E} = -\frac{\Delta \Phi}{\Delta t}$

$= -\frac{(BA\cos\phi - BA_0\cos\phi)}{\Delta t}$

$= -\frac{B\cos\phi\,(A - A_0)}{\Delta t}$

$= -\frac{(0.017)\cos(0)\,(0 - 0.0064)}{0.13\,s}$

$\boxed{\mathcal{E} = 8.4\times10^{-4}\ V}$

(8) $\mathcal{E} = -N \frac{\Delta \Phi_B}{\Delta t}$

$= -N \frac{(BA\cos\phi - B_0 A \cos\phi)}{\Delta t}$

$= -NA\cos\phi \frac{(B - B_0)}{\Delta t}$

$= -(10)(.12)^2 \cos(41) \frac{(0 - 0.090)}{0.17}$

$= 0.056\ V$

$\mathcal{E} = 0.56\ mV$

(9) $\mathcal{E} = -N \frac{\Delta \Phi_B}{\Delta t}$

$= -N \frac{(BA\cos\phi - BA\cos\phi_0)}{\Delta t}$

$= -\frac{NBA}{\Delta t}(\cos\phi - \cos\phi_0)$

$\mathcal{E} \cdot \Delta t = -(50)(0.090)\pi(0.028)^2(\cos 0 - \cos 90)$

$\mathcal{E} \cdot \Delta t = -0.011$

$I = \frac{Q}{\Delta t}$ and $I = \frac{\mathcal{E}}{R}$

$\frac{Q}{\Delta t} = \frac{\mathcal{E}}{R}$

$\frac{\mathcal{E} \cdot \Delta t}{R} = Q$

$Q = \frac{-0.011}{12.5}$

$Q = -8.9 \times 10^{-4}\ C$

$Q = 8.9 \times 10^{-4}\ C$

(10) $\Phi = BA\cos\phi$ $\Phi_0 = BA\cos\phi_0$

$= B\pi(0.05)^2\cos 0$ $= B\pi(0.05)^2\cos 180$

$\Phi = -0.008B$ $\Phi_0 = +0.008B$

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

$$2.5 = -(50)\frac{(0.008B - (+0.008B))}{0.025}$$

$$-0.0028 = -0.016B$$

$$\boxed{B = 0.18\ T}$$

(11) a. ccw

b. cw

c. ccw

d. cw

(12) DOWN

(13) $\frac{V_s}{V_p} = \frac{N_s}{N_p}$

$V_s = \frac{V_p N_s}{N_p}$

$= \frac{(120)(750)}{300}$

$$\boxed{V_s = 300\ V}$$

(14) $\frac{V_s}{V_p} = \frac{N_s}{N_p}$

$V_s = \frac{V_p N_s}{N_p}$

$= \frac{(120)(50)}{250}$

$\boxed{V_s = 24\ V}$

(15) $\frac{N_p}{N_s} = \frac{V_p}{V_s}$

$= \frac{120}{12}$

$= \frac{10}{1}$

$\therefore \boxed{10:1}$

(16) $\frac{I_p}{I_s} = \frac{V_s}{V_p}$

$I_p = \frac{I_s \cdot V_s}{V_p}$

$= \frac{(1.5)(10)}{120}$

$\boxed{I_p = 0.125\ A}$

(17)

$$\frac{Z_p}{Z_s} = \frac{V_p}{V_s}$$

$$= \frac{138\,000}{38\,000}$$

$$\frac{Z_p}{Z_s} = 3.6$$

$\therefore$ **3.6 : 1**

(18)

$$P_s = \frac{(V_s)^2}{R_s}$$

$$V_s = \sqrt{P_s \cdot R_s}$$

$$= \sqrt{(225)(6.42)}$$

$$V_s = 12.01 \text{ V}$$

$$\frac{Z_p}{Z_s} = \frac{V_p}{V_s}$$

$$= \frac{120}{12.01}$$

$$\frac{Z_p}{Z_s} = 10$$

$\therefore$ **10 : 1**