A:

【1】垂直向下	【2】水平向西	【3】V_H / 2	【4】$-V_H$
【5】$2\times10^{-7}\left(\frac{49}{25},\frac{-32}{25}\right)T$	【6】$\left(\frac{32}{11},0\right)$	【7】0	【8】$\frac{\mu_0 I}{2\pi r}$
【9】0	【10】$\frac{\mu_0 l}{2\pi}\ln\frac{b}{a}$	【11】$BlA\sqrt{\frac{2k}{m}}\sin(\sqrt{\frac{2k}{m}}t)$	【12】$BlA\sqrt{\frac{2k}{m}}$
【13】unextended point	【14】E / B_1	【15】r/3	

B:

【1】$2\times10^{-7}\left(\frac{49}{25},\frac{-32}{25}\right)T$	【2】$\left(\frac{32}{11},0\right)$	【3】垂直向下	【4】水平向西
【5】0	【6】$\frac{\mu_0 I}{2\pi r}$	【7】0	【8】$\frac{\mu_0 l}{2\pi}\ln\frac{b}{a}$
【9】V_H /2	【10】$-V_H$	【11】E / B_1	【12】r/3
【13】$BlA\sqrt{\frac{2k}{m}}\sin(\sqrt{\frac{2k}{m}}t)$	【14】$BlA\sqrt{\frac{2k}{m}}$	【15】unextended point	

1. (a) $B_x=\int_{-w/2}^{w/2}\frac{\mu_0 tJdx}{2\pi\sqrt{D^2+x^2}}\frac{D}{\sqrt{D^2+x^2}}=\frac{\mu_0 tJ}{\pi}\tan^{-1}\frac{w}{2D}$

(b) $\tan^{-1}\infty=\frac{\pi}{2}$, therefore $B=\frac{\mu_0 tJ}{2}$,

or $\mu_0(Lt)J=2BL$, therefore $B=\frac{\mu_0 tJ}{2}$

2. (a) $R = \dfrac{\rho 2\pi r \dfrac{X}{2a}}{\pi a^2} = \dfrac{\rho r X}{a^3}$

(b)
$$B = \mu_0 \frac{X/(2a)}{X} I = \frac{\mu_0 I}{2a}$$
$$N\Phi = \frac{X}{2a}\pi r^2 \frac{\mu_0 I}{2a} = LI \rightarrow L = \frac{\pi r^2 \mu_0 X}{4a^2}$$

(c) $\tau = \dfrac{L}{R} = \dfrac{\dfrac{\pi r^2 \mu_0 X}{4a^2}}{\dfrac{\rho r X}{a^3}} = \dfrac{\mu_0 \pi a r}{4\rho}$

3.(a) $B = \mu_0 nI = \mu_0 n(4+5t^2) \therefore \oint E \cdot dl = \dfrac{d\Phi}{dt} = \dfrac{d}{dt}[\mu_0 n(4+5t^2)L^2] = 10\mu_0 ntL^2$

(b) $\Delta V = \dfrac{10\mu_0 ntL^2}{4} = 2.5\mu_0 ntL^2$

4. (a) $\mu = \int_0^R \pi r^2 \dfrac{dq}{T} = \int_0^R \pi r^2 \dfrac{2\pi r \sigma(r) dr}{2\pi/\omega} = \int_0^R \sigma_0 \omega \pi r^4 dr = \dfrac{1}{5}\sigma_0 \omega \pi R^5$

(b) $\vec{\tau} = \vec{\mu} \times \vec{B}$, and $\vec{\mu} \perp \vec{B} \therefore \tau = \mu B = \dfrac{1}{5}\sigma_0 \omega \pi R^5 B$