

[2]

$$(1) E \cdot 2\pi r l = \frac{Q}{\epsilon_0}$$

$$E = \frac{Q}{2\pi r l \epsilon_0}$$

$$V = \int_a^b \frac{Q dr}{2\pi r l \epsilon_0} = \frac{Q}{2\pi l \epsilon_0} \log \frac{b}{a}$$

$$C = \frac{Q}{V} = \frac{2\pi l \epsilon_0}{\log \frac{b}{a}} //$$

$$(3) 0 \leq r \leq a \quad r < r < b$$

$$\# r < r < b$$

$$H \cdot 2\pi r = I \cdot \frac{r}{a^2}$$

$$H = \frac{r I}{2\pi a^2} //$$

$$r > a \quad r < r < b$$

$$H \cdot 2\pi r = I$$

$$H = \frac{I}{2\pi r} //$$

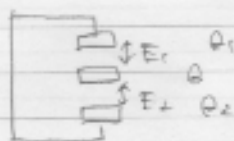
(4)

$$dH = \frac{I}{4\pi a^2} dS //$$

$$H = \int_0^{2\pi a} \frac{I}{4\pi a^2} dS //$$

$$= \frac{I}{2a} //$$

問題3



$$Q = Q_1 + Q_2$$

$$E_1 d_1 = E_2 d_2$$

$$E_1 = \frac{Q_1}{\epsilon_0 A} \quad E_2 = \frac{Q_2}{\epsilon_0 A}$$

$$\frac{Q_1 d_1}{\epsilon_0 A} = \frac{Q_2 d_2}{\epsilon_0 A}$$

$$Q = Q_1 \left(1 + \frac{d_1}{d_2}\right)$$

$$Q_1 = \frac{d_2 Q}{d_1 + d_2}$$

$$E_1 = \frac{d_2 Q}{\epsilon_0 A (d_1 + d_2)}$$

$$E_2 = \frac{d_1 Q}{\epsilon_0 A (d_1 + d_2)} //$$

問題4

$$H = \frac{N}{l} I, \quad B = \mu_0 \frac{N}{l} I$$

$$RI = N \left| \frac{d\Phi}{dt} \right|$$

$$= N \left| \frac{S \mu_0 \frac{N}{l} dI}{dA} \right|$$

$$= \mu_0 S \frac{N^2}{l} \frac{dI}{dt}$$

$$I dt = \frac{\mu_0 S N^2}{R l} dI$$

$$Q = \int_0^{I_0} \frac{\mu_0 S N^2}{R l} dI$$

$$= \frac{\mu_0 S N^2}{R l} I_0 //$$

問題5

$$(1) C = \frac{\epsilon_0 S}{d} = \frac{\epsilon_0}{d} \pi a^2 //$$

$$(2) Q = CV = \frac{\epsilon_0 \pi a^2}{d} V_0 \sin \omega t //$$

$$(3) D = \frac{Q}{\pi a^2} = \frac{\epsilon_0 V_0}{d} \sin \omega t //$$

$$(4) I = \frac{dQ}{dt} = \frac{\omega \epsilon_0 \pi a^2 V_0}{d} \cos \omega t //$$

$$(5) \oint_C \vec{H} \cdot d\vec{r} = \int_S \left\{ \vec{H} \cdot \frac{d\vec{S}}{dt} \right\} dS //$$

$$H \cdot 2\pi r = \int_S \frac{\omega \epsilon_0 V_0}{d} \cos \omega t \cdot dS //$$

$$= \frac{\omega \epsilon_0 V_0 \pi a^2}{d} \cos \omega t$$

$$H = \frac{\omega \epsilon_0 V_0 a^2}{2rd} \cos \omega t //$$