1. $r = 3 \times 10^{-2}$ m $I = 3$A

a) $l = 0.2$ m $l_{sq} = 1 \times 10^{-2}$ m

$N = 100$ $N_{sq} = 1$

$$\Phi_B = BA\cos\theta$$

$$= \frac{\mu_0 I N}{l} \times (1 \times 10^{-2})^2 \times \cos 0$$

$$= 1.885 \times 10^{-7} \text{ Tm}^2$$

b) $$\mathcal{E} = -\frac{(0 - 1.885 \times 10^{-7})}{3}$$

$$= 6.283 \times 10^{-8} \text{ V}$$

3. $R = 6\,\Omega$ $l = 1.2$ m $B = 2.5$ T

a)

$$\mathcal{E} = IR$$

$$= 0.5 \times 6$$

$$= 3 \text{ V}$$

$$\mathcal{E} = Blv$$

$$v = \frac{\mathcal{E}}{Bl} = \frac{3}{2.5 \times 1.2}$$

$$= 1 \text{ m/s}$$

b) $R = 6\,\Omega$ $B = 2.5$ T $l = 1.2$ m $v = 2$m/s

$$\mathcal{E} = Blv$$

$$= 6 \text{V}$$

$$I = \frac{V}{R} = \frac{6\text{V}}{6\,\Omega} = 1 \text{ A}$$

$F = ILB \sin\theta$

$= 1 \times 1.2 \times 2.5 \times \sin 90$

$= \underline{3\ N} \rightarrow$

$P = I^2 R$

$= 1 \times 6$

$= \underline{6\ W}$

Chapter 32

3. $\tau = \frac{L}{R} = \frac{2}{10} = 0.2\ s$

$i(t) = \frac{12}{10}\left(1 - e^{-t/\tau}\right)$

$0.5 \times \frac{12}{10} = \frac{12}{10}\left(1 - e^{-t/\tau}\right)$

$e^{-t/\tau} = 0.5$

$\frac{-t}{0.2} = \ln(0.5)$

$-t = -0.139$

$t = 0.139\ s \rightarrow$

6. $\omega = \frac{1}{\sqrt{LC}}$

$f = \frac{1}{2\pi\sqrt{LC}} = \frac{1}{2\pi\sqrt{1 \times 10^{-7}}}$

$Q = CV$

$= 12 \times 10^{-6}$ C

$\frac{1}{2} C V^2 = \frac{1}{2} L I^2$

$10^{-6} \times 144 = 0.1$