

①

$$C_{eq} = 2 + 6 = 8 \text{ MF}$$

$$\frac{1}{C_{eq}} = \frac{1}{8} + \frac{1}{28} + \frac{1}{8}$$

$$C_{eq} = 2.67 \text{ MF}$$

②

$$Q = C \Delta V$$

$$C = \frac{k \epsilon_0 A}{d}$$

$$= \frac{8.85 \times 10^{-12} \times 2.30 \times 10^{-4}}{1.50 \times 10^{-3}}$$

$$= 1.36 \text{ pF}$$

$$Q = (1.36 \text{ pF})(12 \text{ V}) = 16.3 \text{ pC}$$

③

$$C = \frac{k \epsilon_0 A}{d} \Rightarrow d = \frac{k \epsilon_0 A}{C}$$

$$d = \frac{(5)(8.85 \times 10^{-12})(0.2 \text{ m}^2)}{4000 \times 10^{-12}}$$

$$d = 2.21 \text{ mm}$$

$$\begin{aligned} \textcircled{4} \quad U_{\text{cap}} &= \frac{1}{2} CV^2 \\ &= \frac{1}{2} (12 \times 10^{-6}) (100)^2 \\ &= 60 \text{ mJ} \end{aligned}$$

$$\textcircled{5} \quad I = n q v_d A$$

if I is doubled, v_d doubles

(b) increased by double

$$\begin{aligned} \textcircled{6} \quad Q &= It = (16 \times 10^{-10}) (1 \times 10^{-9}) \\ &= 16 \times 10^{-19} \text{ C} \end{aligned}$$

$$n = \frac{Q}{e} = \frac{16 \times 10^{-19}}{1.6 \times 10^{-19}} = 10 \text{ electrons}$$

$$\textcircled{7} \quad \alpha = \frac{\Delta R}{R_0} \frac{1}{\Delta T}$$

$$\Delta T = \frac{\Delta R}{\alpha R_0} = \frac{(140 - 19)}{(5 \times 10^{-3})(19)} = 1273.7$$

$$\Delta T = T - T_0 = 1273.7$$

$$\rightarrow T = 1273.7 + 20 = 1294^\circ \text{C}$$

$$\textcircled{8} \quad P = IV = (10)(110) \\ = 1100 \text{ W} = 1.1 \text{ kW}$$

$$\text{Energy (kWh)} = (1.1 \text{ kW})(8 \text{ h}) \\ = 8.8 \text{ kWh}$$

$$\text{Cost} = (8.8 \text{ kWh})(5 \times 10^{-2} \frac{\text{SR}}{\text{kWh}}) \\ = 0.44 \text{ SR}$$

$$\textcircled{9} \quad R_{eq} = 2 + 4 + \left(\frac{3}{4}\right) \\ = 6.75 \Omega$$

$$I = \frac{\Delta V}{R} = \frac{18}{6.75} = 2.67 \text{ A}$$

10)

$$\Delta V = \mathcal{E} - IR$$

$$r = \frac{\mathcal{E} - V}{I} = \frac{12 - 11.6}{30}$$

$$r = 0.013 \Omega$$

(11) Volt

(12) $\frac{1}{R_{eq}} = \frac{1}{R_1} + \frac{1}{R_2} + \frac{1}{R_3}$

(13) $F = ma$

$$F_B = 9 \text{ VIB} = ma$$

$$a = \frac{9 \text{ VIB}}{m}$$

$$= \frac{(1.6 \times 10^{-19}) / (2 \times 10^4) (3 \times 10^{-3})}{9.11 \times 10^{-31}}$$

$$= 1.05 \times 10^{13} \text{ m/s}^2$$

(14) $F_B = I \ell B$

$$\ell = \frac{F_B}{IB} = \frac{3 \times 10^{-3} \text{ N}}{(2 \times 10^{-3}) (4)}$$

$$= 0.375$$

$$(15) \quad T = 5 \text{ msec}$$

$$m = 0.2 \text{ g}$$

$$B = 2 \text{ T}$$

$$q = ?$$

$$T = \frac{2\pi m}{qB}$$

$$q = \frac{2\pi m}{TB}$$

$$= \frac{(2\pi)(0.2 \times 10^{-3})}{(5 \times 10^{-3})(2)}$$

$$q = 12.56 \times 10^{-2} \text{ C}$$