

일반물리2 과제풀이 CH.24

18번.

$$r=0.005m, V=1.4V/m, I=50A$$

$$E = \rho J, \rho = \frac{E}{J} = \frac{E}{I/A} = \frac{E(\pi r^2)}{I} = 2.2 \times 10^{-4} \Omega \cdot m$$

35번.

$$I_{\max} = 24A, J_{\max} = 12MA/m^2$$

$$(a). J = \frac{I}{A} \text{ 이므로 } J_{\max} = \frac{I_{\max}}{\pi r^2}, r^2 = \frac{I_{\max}}{\pi J_{\max}} = \frac{24A}{\pi 12MA/m^2}, 2r = 2\sqrt{\frac{24A}{\pi 12MA/m^2}} = 1.6mm$$

$$(b). E = \rho J \text{ 이므로 } E_{\max} = \rho_{cu} J_{\max} = (1.68 \times 10^{-8} \Omega \cdot m)(12MA/m^2) = 0.2016 V/m$$

39번.

$$r=0.320mm, L=2.25m, V=235mV, I=1.27A$$

$$(a). V=IR, R = \frac{V}{I} = \frac{\rho L}{A}, R = \frac{235mV}{1.27A} = \frac{\rho(2.25m)}{\pi(0.320mm)^2}$$

$$\rho = \frac{(235mV)\pi(0.320mm)^2}{(1.27A)(2.25m)} = 2.65 \times 10^{-8} \Omega \cdot m : \text{알루미늄}$$

$$(b). I = \frac{VA}{\rho L} = \frac{(235mV)\pi(0.320mm)^2}{(1.68 \times 10^{-8})(2.25m)} = 2.0A$$

42번.

$$(a). I_{\text{평균}} = \frac{q}{t} = \frac{I \Delta t}{t} = \frac{(2.4pA)(0.2t)}{t} = 0.48pA$$

$$(b). N = \frac{Q}{e} = \frac{(2.4pA)(1.0ms)}{(1.6 \times 10^{-19}C)} = 1.519 \times 10^4$$

43번.

$$r=0.025mm, I=0.833A$$

$$(a). J = \frac{I}{A} = \frac{0.833A}{\pi(0.025mm)^2} = 420A/mm^2$$

$$(b). J = \frac{0.833A}{\pi(1.05mm)^2} = 0.24A/mm^2$$