

生機系電工學第一次隨堂練習 2012/03/07

學號：_____ 姓名：_____

1. What is the area in circular mils of wires having diameter of 1/32 in?

$$d = \frac{1}{32} \text{ in} = 0.03125 \text{ in} \quad d_{\text{mils}} = 31.25 \text{ mils} \quad A_{\text{CM}} = (d_{\text{mils}})^2 = 976.56 \text{ CM}$$

2. What is the diameter in inches of wires having the area of 50,000 CM ?

$$d_{\text{mils}} = \sqrt{50,000 \text{ CM}} = 223.61 \text{ mils} \quad d = 0.2236 \text{ in}$$

3. Determine the resistance of 50 ft of 1/16-in. diameter copper wire. The resistivity of copper is 10.37 CM-Ω/ft

先求 1/16in 為多少 ACM ?

$$d_{\text{mils}} = 62.5 \text{ mils} \quad A_{\text{CM}} = (d_{\text{mils}})^2 = 3,906.25 \text{ CM}$$

$$R = \rho \frac{\ell}{A} = (10.37 \text{ CM} - \Omega / \text{ft}) \frac{(50 \text{ ft})}{3,906.25 \text{ CM}} = 132.74 \text{ m}\Omega$$

4. If the resistance of a copper conductor is 2Ω at room temperature (T = 20°C), what is its resistance at 100°C (the boiling point of water)? The inferred absolute temperature of copper is -234.5°C.

$$\frac{T + t_1}{R_1} = \frac{T + t_2}{R_2} \quad \frac{234.5 + 20}{2\Omega} = \frac{234.5 + 100}{R_2} \quad R_2 = \frac{334.5(20)}{254.5} = 2.63\Omega$$

5. (a) Determine the resistance of a modeled composition resistor with the following color bands: red, red, brown, gold. (b) Indicate its expected range of values.

(a) Resistance is 220Ω ±5% (b) Expected range of values: 209Ω ~231Ω