

EET 263 Homework 10 Joe Munoz 23 Mar 2024

8. 200 Ω plat RTD measures 222 Ω

$$T = \frac{\Delta R(t)}{\alpha R(0)} = \frac{222 - 200}{.00385 \cdot 200} = \boxed{28.57^\circ\text{C}}$$

$$\alpha = .00385$$

10. 100 Ω plat RTD $T = 100^\circ\text{C}$

$$T = \frac{R_1 - R_0}{\alpha R(0)}$$

$$R_1 = T \cdot \alpha \cdot R(0) + R_0 = 100 \cdot .00385 \cdot 100 + 100 = \boxed{138.5 \Omega}$$

$$13. \epsilon = \frac{\Delta L}{L} = \frac{97\text{mm} - 100\text{mm}}{100\text{mm}} = \boxed{-.03 \epsilon}$$

$$L = 100\text{mm} \quad L_2 = 97\text{mm}$$

$$14. \epsilon = -225 \times 10^{-6} \quad L = 20\text{ft}$$

$$\epsilon = \frac{L_2 - L_1}{L_1} \quad \epsilon \cdot L_1 + L_1 = L_2$$

$$L_1 \quad (-225 \times 10^{-6} \cdot 20\text{ft}) + 20\text{ft} = L_2$$

$$\boxed{L_2 = 19.9955 \text{ ft}}$$

$$15. K = \frac{\Delta R/R}{\epsilon} = \frac{\Delta R/R}{\Delta L/L} \quad R = 1\text{K} \Omega \quad \Delta R = 1.575 \Omega$$

$$\epsilon = 450 \times 10^{-6}$$

$$\boxed{K = \frac{1.575}{1000} \cdot \frac{1000}{450 \times 10^{-6}} = 3.5}$$

$$19. \frac{10 \text{ mi}}{h} \cdot \frac{5280 \text{ ft}}{\text{mi}} \cdot \frac{1 \text{ h}}{3600 \text{ s}} = 14.667 \text{ ft/s} = V$$

$$A = 10 \text{ ft} \times 5 \text{ ft} = 50 \text{ ft}^2$$

$$Q = V \cdot A = 14.667 \text{ ft/s} \cdot 50 \text{ ft}^2 = \boxed{733.3 \text{ ft}^3/\text{s}}$$

$$21. \frac{470 \text{ pulses}}{\text{min}} \cdot \frac{1 \text{ gal}}{60 \text{ pulses}} = \boxed{7.83 \text{ gal/min}}$$

$$22. \text{ cal factor} = 2 \frac{\text{pulses}}{\text{gal}} \quad T = 1.75 \frac{\text{sec}}{\text{Pulse}}$$

$$Q = ? \frac{\text{Gals}}{\text{min}}$$

$$Q = \left(\frac{1.75 \text{ sec}}{\text{Pulse}} \cdot \frac{2 \text{ pulses}}{\text{gal}} \right)^{-1} \cdot \frac{60 \text{ sec}}{1 \text{ min}} = \boxed{17.14 \text{ gal/min}}$$

$$\frac{60 \text{ sec}}{1 \text{ min}} \cdot \frac{3.5 \text{ sec}}{1 \text{ gal}}$$

$$Q = \frac{60 \text{ sec}}{1 \text{ min}} \cdot \frac{T}{\text{Pulse}} \cdot \frac{2 \text{ pulses}}{\text{gal}}$$