

OBILDM CHIDERA
16/ENG091068

EEES52 Assignment

A $E = \pi L$

$$\frac{E}{\pi} = L$$

$$\textcircled{1} L = \frac{44.000}{\pi} \times \frac{85}{100}$$

$$= 11.91 \times 10^3 \text{ cd/m}^2$$

$$\textcircled{2} L = \frac{0.22 \times 85}{\pi \times 100}$$

$$= 59.52 \times 10^{-3} \text{ cd/m}^2$$

B $\phi = I \times \omega$

$$= 120 \times 4\pi$$

Flux ^{absorbed} emitted by globe = $\frac{120 \times 4\pi \times 30}{100} = 144\pi = 452.39 \text{ lum}$

$$\text{Flux emitted by globe} = (144\pi) + (120 \times 4\pi) \\ = 336\pi = 1055.58 \text{ lum}$$

$$\text{Luminance} = \frac{\text{Flux emitted}}{\text{Area}} = \frac{336\pi}{(0.22)^2 \times \pi} = \frac{336}{(0.22)^2} = 6942.15 \text{ cd/m}^2$$

$$\textcircled{3} \text{ Candle Power} = \frac{\text{lumens}}{\omega} = \frac{336\pi}{4\pi} = 84 \text{ Cd}$$

C

$$C. \quad A = 75 \times 10^{-4} \text{ m}^2 = 75 \text{ cm}^2 \quad \mu = 0$$

$$t = 2 \times 10^{-2} \text{ m} = 2 \text{ mm}$$

$$\text{heat required} = \rho V \Delta \theta$$

$$\text{Density} = \frac{M}{V}$$

$$M = 0.55 \frac{\text{g}}{\text{cm}^3} \times 75 \times 2 \text{ cm}^3$$

$$M = 82.5 \text{ g}$$

$$C = \frac{\epsilon_0 \epsilon_r A}{t} = \frac{8.85 \times 10^{-12} \times 16.5 \times 75 \times 10^{-4}}{2 \times 10^{-2}} = 21.57 \times 10^{-12} \text{ F}$$

$$\omega = 2\pi f = 2\pi (30 \times 10^6)$$

$$= 125.664 \times 10^6 \text{ rad/s}$$

$$\text{Power factor} = \cos \theta = 0.04$$

$$\theta = \cos^{-1}(0.04)$$

$$\theta = 87.7^\circ$$

$$\delta = 90 - \theta = 90 - 87.7 = 2.3^\circ$$

$$\text{heat required} = M C \Delta \theta$$

$$= 82.5 \times 0.285 \times (30 - 35)$$

$$= 1051.88 \text{ cal}$$

$$\text{Total heat required} = \frac{1051.88}{100} \times 85$$

$$= 894.098 \text{ Cal}$$

$$\begin{aligned} \text{Power input} &= 894.095 \times 4.186 \\ &= 3742.7 \text{ (W-s)} \end{aligned}$$

$$P = \frac{\text{Energy}}{\text{time}} = \frac{3742.7}{8 \times 60} = 7.797 \text{ W}$$

$$P_0 = V^2 \omega C \tan \delta$$

$$7.797 = V^2 \times 125.664 \times 10^6 \times 21.57 \times 10^{-12} \times \tan(2.3^\circ)$$

$$V^2 = \frac{7.797}{125.664 \times 10^6 \times 21.57 \times 10^{-12} \times \tan(2.3^\circ)}$$

$$V^2 = 262.6 \text{ V}$$

$$P = IV \cos \phi$$

$$I = \frac{7.797}{267.827 \times 0.94}$$

$$I = 0.7224 \text{ A}$$