EEE552 Assignment

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mtt **multi - tecnik & trade.**

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a) (i) $E = \pi L = \frac{I}{r^2}$

$E = \pi L$

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

Considor reflection factor

$L = \frac{E}{\pi} \times$ reflection factor.

$= \frac{HH,000}{\pi} \times \frac{85}{100} = 11.905 \times 10^3$ Cd/m2

(ii) $E = 0.22$

$L = \frac{0.22}{\pi} \times \frac{85}{100} = 59.52 \times 10^{-3}$ Cd/m2

b) 1-

Flux emitted from source

$\phi = I \times \omega = 120 \times 4\pi$ lumen

Flux emitted by globe with 30% absorbed.

$120 \times 4\pi \times \frac{30}{100}$

$\Rightarrow 144\pi$

∴ Flux emitted by globe $= 120 \times 4\pi - 144\pi$

$= 336\pi$ lumens

but luminance $= \frac{\text{Flux emitted by globe}}{\text{Area}} = \frac{336\pi}{4 \times 0.22^2}$

$= 6942$ lm/m²

II- Candle Power $= \frac{\text{lumen}}{\omega}$

$= \frac{336\pi}{4\pi} = 84$ Cd

c) $A = 75 \times 10^{-4}$ m² $= 75$ cm²

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

heat required $= mc\Delta\theta$

Density $= \frac{m}{V}$ ∴

$m = V \times \text{Density} = 0.55 \text{ g/cm}^3 \times (75 \times 2)\text{cm}^3 = 82.5$ g

$$\therefore C = \frac{\varepsilon_0 \varepsilon_r A}{t}$$

$$= \frac{8.85 \times 10^{-12} \times 6.5 \times 75 \times 10^{-4}}{2 \times 10^{-2}} =$$

$$C = 21.57 \times 10^{-12} f$$

Note

$$W = 2\pi f$$

$$= 2\pi \times 20 \times 10^6 = 125.664 \times 10^6 \text{ rad/s}$$

$$\therefore Pf = \cos\theta = 0.04$$

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

$$= 87.7$$

Hence $\delta = 90 - \theta = 90 - 87.7 = \underline{2.3^\circ}$

Heat required $= mc\Delta\theta$

$$= 82.5 \times 0.255 \times (80 - 30)$$

$$= 1051.88 \text{ Cal}$$

Total heat required $= 1051.88 \times \frac{88}{100} = \underline{894.098 \text{ Cal}}$

Recall

$$1 \text{ cal} = 4.186 \text{ (w.s) J}.$$

$$894.098 = x$$

$$x = 4.186 (894.098) = 3742.7 \text{ (w.s)}$$

$\therefore$ Power Input $= 37\text{H}2.7\ (\text{w-s})$

$$P = \frac{\text{Energy}}{\text{time}} = \frac{37\text{H}2.7}{8 \times 60}$$

$$= \underline{7.797\ \text{w}}$$

$$P_0 = V^2 \text{w} C \tan\delta$$

$$7.797 = V^2 \times 125.664 \times 10^6 \times 21.57 \times 10^{-12} \times \tan 23^\circ$$

$$7.797 = V^2\ 1.08868 \times 10^{-4}$$

$$V = \sqrt{\frac{7.797}{1.08868 \times 10^{-4}}}$$

$$V = 267.616\text{V}$$

$$\cong \underline{267.62\text{V}}$$

$$\therefore P = IV\cos\theta$$

$$\text{Hence } I = \frac{P}{V\cos\theta} = \frac{7.797}{267.62 \times 0.04}$$

$$= 0.72836$$

$$\cong \underline{0.728\text{H A}}$$