Name _____
Physics 51 Section ___ Box # _____
Problem Set 5
8 October 2018

Collaborators:

HRK P29.5 Solo (a) The current density across a cylindrical conductor of radius R varies according to the equation

$$j = j_0(1 - r/R)$$

where r is the distance from the axis. Thus the current density is a maximum j_0 at the axis $r = 0$ and decreases linearly to zero at the surface $r = R$. Calculate the current in terms of j_0 and the conductor's cross-sectional area $A = \pi R^2$. (b) Suppose that, instead, the current density is a maximum j_0 at the surface and decreases linearly to zero at the axis so that

$$j = j_0 r/R$$

Calculate the current. Why is the result different from (a)?

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HRK 31.47 Figure 31-39 shows the circuit of a flashing lamp, like those attached to barrels at highway construction sites. The florecent lame L is connected in parallel across the capacitor C of an RC. Current passes through the lamp only when the potential across it reaches the breakdown voltage V_L; in this even the capacitor disharges through the lamp and it flashes for a very short time. Suppose that two flashed per second are needed.Using a lamp with a breakdown voltage $V_L = 72V$,a $95 - V$ battery and a $0.15 - \mu F$ capacitor, what should be the resistance R of the resistor?

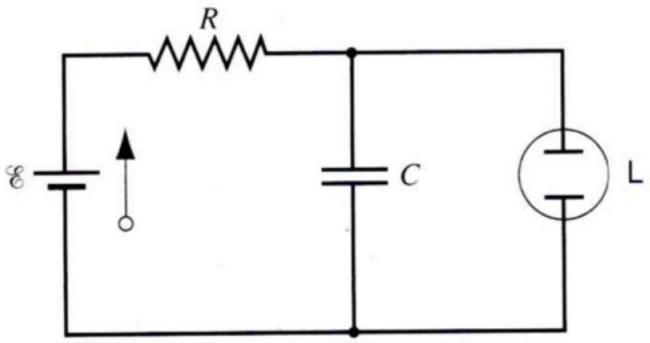

FIGURE 31-39. Exercise 47.

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