ID:	Name:

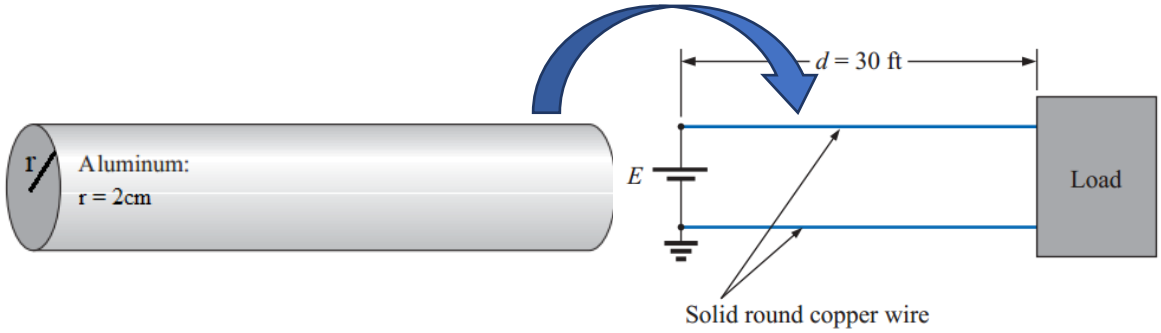
BRAC University

Semester: Fall 2019
Course ID: CSE250
Course Title: CIRCUITS AND ELECTRONICS
Full Marks: 25
Quiz: 1

Section: 14
Faculty: SHS
Time: 25 minutes
Date: October 2, 2019

[Each of the questions carry 5 marks]

1.



Aluminum has a resistivity of $2.75 * 10^{-8}\Omega m$ at $20°C$ and a temperature co-efficient(α) of about $4.29 * 10^{-3}\ °C^{-1}$. Assuming length and radius of the Aluminum wire doesn't change, what will be the resistance of the wire at $50°C$?

Answer: $4.51 \times 10^{-4}\ \Omega$

Given that, $\rho_0 = 2.75 \times 10^{-8}\ \Omega m$ [at 20°C]

$\alpha = 4.29 \times 10^{-3}\ °C^{-1}$

We know, $\rho = \rho_0 (1 + \alpha \Delta T)$

$= \rho_0 (1 + \alpha (50 - 20)) = 3.104 \times 10^{-8}\ \Omega m$

$r = 2\ cm = 0.02\ m$

$A = \pi r^2 = 0.0012566\ m^2$

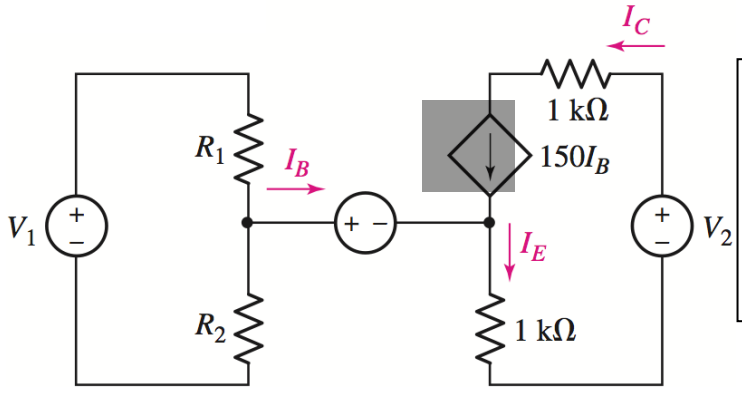
$\approx 1.26 \times 10^{-3}\ m^2$

$L = 2d = 2 \times 30\ ft = 60\ ft = 18.288\ m$

$R = \frac{\rho L}{A} = \frac{3.104 \times 10^{-8} \times 18.3}{1.26 \times 10^{-3}}\ \Omega$

$= 4.51 \times 10^{-4}\ \Omega$

2. Write the full name of the shaded component.



Answer: Current Dependent Current Source

3. If an electric heater draws 2000 W when connected to a 220-V supply, what is the internal resistance of theheater? How much current is flowing through the heater?

Answer: 24.2Ω 9.09 A

Given that, $V = 220\ V$, $P = 2000\ W$

We know that, $P = \frac{V^2}{R}$

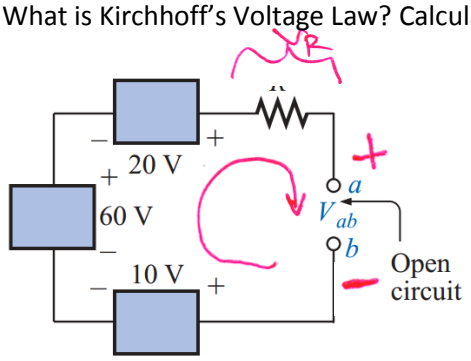
$\Rightarrow R = \frac{V^2}{P} = \frac{(220)^2}{2000}\ \Omega = 24.2\ \Omega$

Again, $P = VI$ $\Rightarrow I = \frac{P}{V}$ } or, you could use $V=IR$

$\Rightarrow I = \frac{2000}{220}$

$= 9.09\ A$

4. What is Kirchhoff's Voltage Law? Calculate the value of the open circuit voltage(V_{ab}).



KVL: Algebraic/Phasor sum of all the voltage drops around a mesh/supermesh (any closed loop) in a circuit must be zero. Mathematically, $\sum V = 0$.

V_{ab}: 70V

$V_{ab} = V_a - V_b$.

So, $V_a \rightarrow$ + end

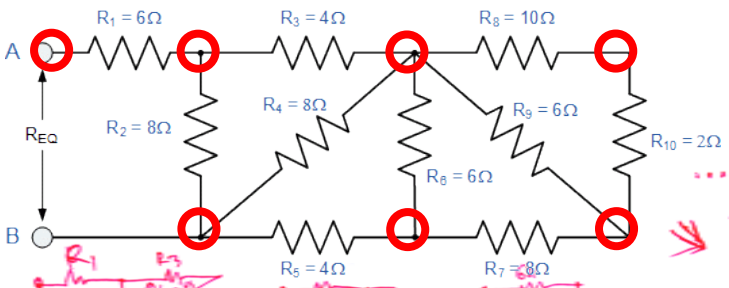
$V_b \rightarrow$ - end

Since, open circuit, current is zero. So, Voltage across R, $V_R = IR = 0 \times R = 0$

Applying KVL, $\Sigma V = 0$

$\Rightarrow 10 - 60 - 20 + \underbrace{0}_{V_R} + V_{ab} = 0$ $\Rightarrow V_{ab} = 70V$

5. Identify all the nodes in the given circuit. What is the equivalent resistance of the network?



Answer: 10 Ω