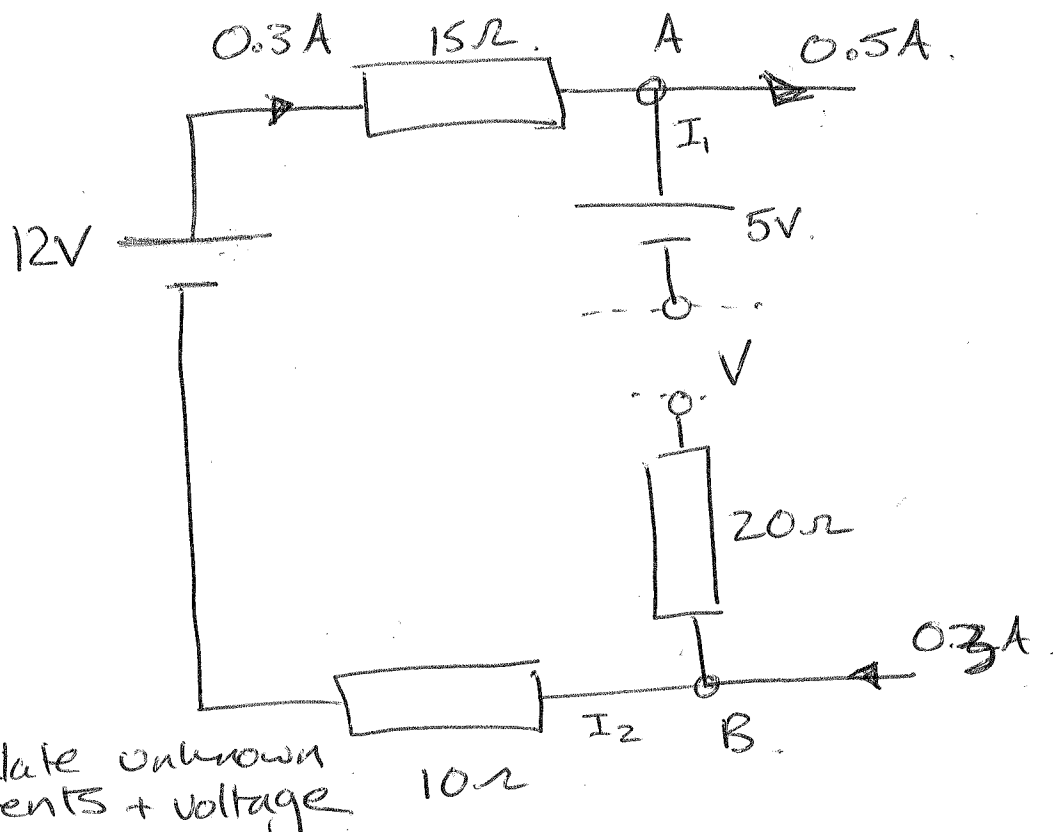


Q1



AI

(A) $0.3 + I_1 - 0.5 = 0$
 $I_1 = 0.5 - 0.3 = 0.2 \text{ A (toward A)}$

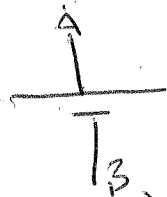
(B) $0.3 + I_2 - 0.2 = 0$
 $I_2 = 0.2 - 0.3 = -0.1 \text{ A (leaving B)}$

$$12 - (0.3 \times 15) - 5 + V + (0.2 \times 20) - (0.1 \times 10) = 0$$

$$V = (0.3 \times 15) + 5 + (0.1 \times 10) - 12 - (0.2 \times 20)$$

$$V = 4.5 + 5 + 1 - 12 - 4$$

$$V = -5.5 \text{ V}$$



Q2. If a wire has the following resistances
Calculate the temperature coefficient

Temp $^{\circ}\text{C}$	Resistance
0°C	0.06Ω
200°C	0.13Ω

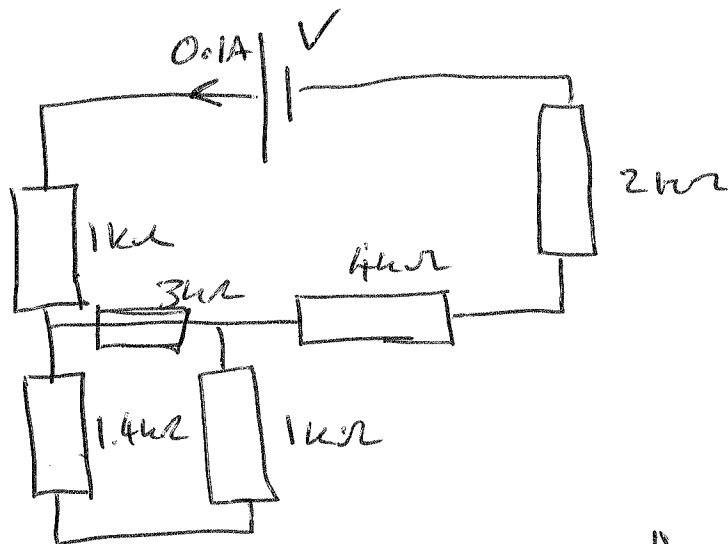
A2

$$\Delta R = R_0 \alpha \Delta T$$

$$\alpha = \frac{\Delta R}{R_0 \Delta T} = \frac{0.13 - 0.06}{0.06 \times (200 - 0)}$$

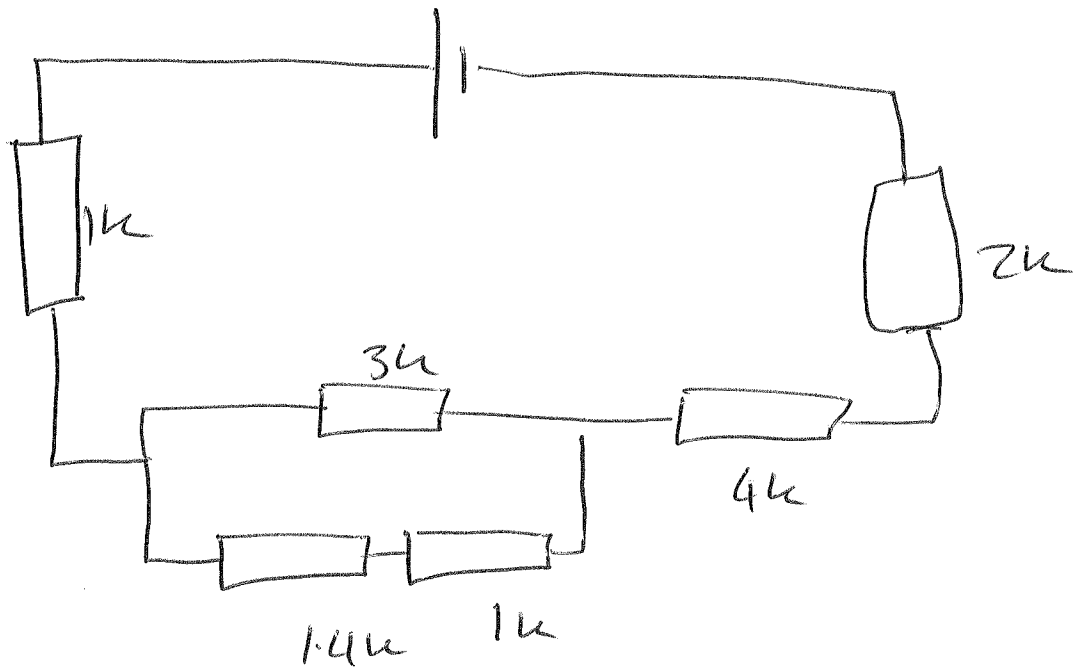
$$= 0.00583 \Omega \text{K}^{-1}$$

Q3



Calculate total resistance, voltage supply and power dissipated by $4 \text{ k}\Omega$ resistor.

A3



$$R_T = 1 + 2 + 4 + \frac{1}{\frac{1}{3} + \frac{1}{1.4+1}}$$

$$= 7 + \frac{1}{\frac{1}{3} + \frac{1}{2.4}} = 1.33 + 7$$

$$= 8.33 \text{ k}\Omega$$

$$V = IR = 0.1 \times 8.3 \times 10^3 = \underline{\underline{833 \text{ V}}}$$

$$P = I^2 R = 0.1^2 \times 4000 = \underline{\underline{40 \text{ W}}}$$

Q4

Calculate the terminal voltage of a car battery during cranking when its E_{mf} is 14.1 V and a current of 80 A is drawn through an internal resistance of 0.0413Ω .

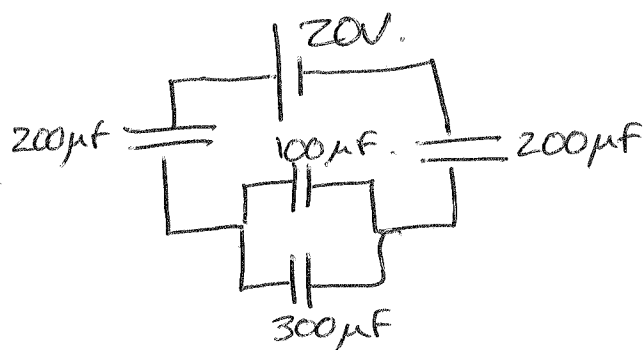
A4

$$V = E_{mf} - IR_s$$

$$V = 14.1 - (80 \times 0.0413)$$

$$V = 10.8 \text{ V.}$$

Q5



- Calculate total capacitance
- Calculate total charge stored
- Calculate total energy stored.

$$\text{AS } C_T = \frac{1}{\frac{1}{100} + \frac{1}{300} + \frac{1}{200}} = 80 \mu\text{F.}$$

$$Q = CV = 80 \times 10^{-6} \times 20 = 0.0016 \text{ C.}$$

$$E = \frac{CV^2}{2} = \frac{80 \times 10^{-6} \times 20^2}{2} = 0.016 \text{ J.}$$