ECS 203 2014: Quiz 3 Sol

Instructions

i. Separate into groups of no more than three persons. Make sure the group members are not exactly the same as any of your earlier groups.

ii. Only one submission is needed for each group. Late submission will not be accepted.

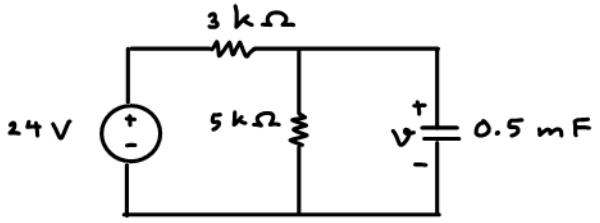
iii. ***Write down all the steps*** that you have done to obtain your answers. You may not get full credit even when your answer is correct without showing how you get your answer.

Name	ID
Prapun	555

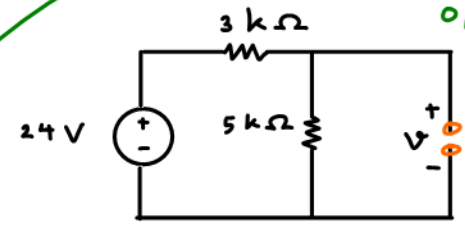
Find the voltage v under dc condition in each of the following circuits.

under dc condition, capacitor becomes an open circuit. This same reasoning is applied in all parts.

(a)

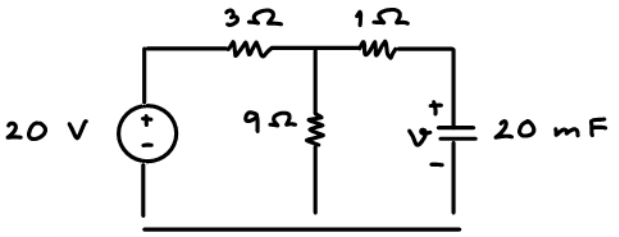


dc ⇒

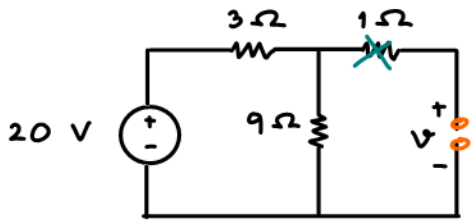


Note that v is the same as the voltage across the 5 kΩ resistor. By the voltage divider formula: $v = \frac{5k}{5k+3k} \times 24 = 15$ V

(b)



dc ⇒

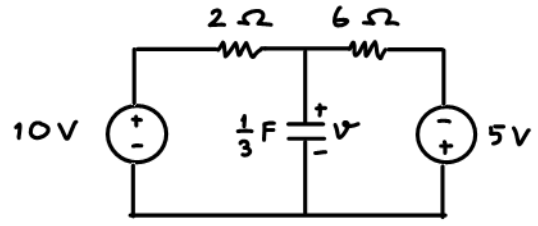


Here, note that the open circuit prevents any current to flow through the 1Ω resistor.

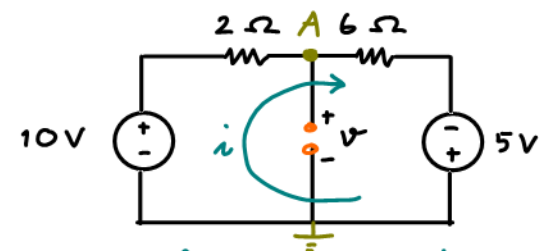
Therefore, there is no voltage drop across the 1Ω resistor and hence v is the same as the voltage across the 9Ω resistor. Furthermore, since there is no current through the 1Ω resistor, it is simply a hanging branch which can be eliminated from our consideration. By the voltage divider formula,

v = voltage across the 9Ω resistor $= \frac{9}{9+3} \times 20 = \frac{9}{12} \times 20 = 15$ V

(c)



dc ⇒



Method 1: Mesh analysis: There is only one mesh. Applying KVL gives $10 - i \times 2 - i \times 6 + 5 = 0$. This implies $i = \frac{15}{8}$ A. So, $v = 10 - \frac{15}{8} \times 2 = \frac{25}{4} = 6.25$ V

Method 2: Nodal analysis: KCL @ A gives $3 \times \frac{v_A - 10}{2} + \frac{v_A - (-5)}{6} = 0 \Rightarrow v_A = \frac{25}{4}$. Note that $v = v_A$.