

Question 7

1. Using series equivalent resistance we have

$$30\Omega + 10\Omega = 40\Omega$$

Then we use parallel equivalent resistance

$$\frac{1}{R_p} = \frac{1}{40} + \frac{1}{40}$$

$$R_p = \frac{1}{0.05} = 20\Omega$$

and again using series equivalent resistance

$$20\Omega + 35\Omega = \boxed{55\Omega}$$

2. Ohm's law $\Rightarrow V = IR$

$$I = \frac{V}{R} = \frac{10}{55} = \boxed{0.182\text{ A}}$$

$$3. \text{ Voltage-drop} = 35 \times 0.182 = \boxed{6.37\text{ V}}$$

$$4. V_A = 10 - V_{35} = 10 - 6.37 = \boxed{3.63\text{ V}}$$

$$5. V = IR \Rightarrow I_2 = \frac{V}{R} = \frac{3.63}{40} = \boxed{0.091\text{ A}}$$

$$6. \text{ Voltage drop across } 30\Omega \Rightarrow I \times R = 0.091 \times 30 = 2.73\text{ V}$$

$$\text{Voltage drop across } 10\Omega \Rightarrow I \times R = 0.091 \times 10 = 0.91\text{ V}$$

$$\text{Checks out} \Rightarrow 2.73 + 0.91 = 3.64\text{ V} \checkmark$$

$$7. I_1 = I_2 + I_3 \Rightarrow I_3 = I_1 - I_2 = 0.182 - 0.091 = \boxed{0.091\text{ A}}$$

$$8. V = IR \Rightarrow 0.091 \times 40\Omega = \boxed{3.64\text{ V}} \rightarrow \text{same as step 4}$$

Question 9.

1. total resistance when $R_1 = 33\Omega \Rightarrow$

$$5 + 2 + 33 = 40$$

$$I_L = \frac{100V}{40\Omega} = 2.5A.$$

2. Voltage across $R_L = I_L \times R_L$

$$= 2.5 \times 33$$

$$= 82.5V$$