

# EECE 210 – Electric Circuits

## Homework 1 - Solution

2.8

5/5

$$50\text{ V source: } p = v i = 50 \times 20 = 1000\text{ W}$$

$$10\text{ V source: } p = v i = 10 \times 5 = 50\text{ W} \rightarrow 1050\text{ W}$$

$$40\text{ V source: } p = v i = -5 \times 40 = -200\text{ W}$$

$$5\text{ A source: } p = v i = -5 \times 90 = -450\text{ W} \rightarrow -1050\text{ W}$$

$$15\text{ A source: } p = -15 \times 50 = -750\text{ W}$$

Total power developed is 2100 W

2.11

5/5

$$\text{By KCL: } 75 - 5n_2 - 25 = 0$$

$$n_2 = 10\text{ V}$$

$$20\text{ V element: } p = 5 \times 10 \times 20 = 1000\text{ W}$$

$$50\text{ V element: } p = 75 \times 50 = 3750\text{ W}$$

$$25\text{ A element: } p = -25 \times 10 = -250\text{ W}$$

$$\text{By KVL: } -20 - 10 + V_{n_2} = 0$$

$$V_{n_2} = 30\text{ V}$$

$$5n_2\text{ element: } p = -5 \times 10 \times 30 = -1500\text{ W}$$

$$\text{By KVL: } 30 - 20 - 50 + n_{75\text{A}} = 0$$

$$n_{75\text{A}} = 40\text{ V}$$

$$75\text{ A element: } p = -75 \times 40 = -3000\text{ W}$$

total power developed is 9500 W ✓

2.15

8/8

By KCL:  $i_g - i_a - i_b = 0$

$i_g - i_b - 80 = 0$

KVL:  $20(8+14+18) - 10 i_b = 0$

$i_b = 80 \text{ A}$  ✓

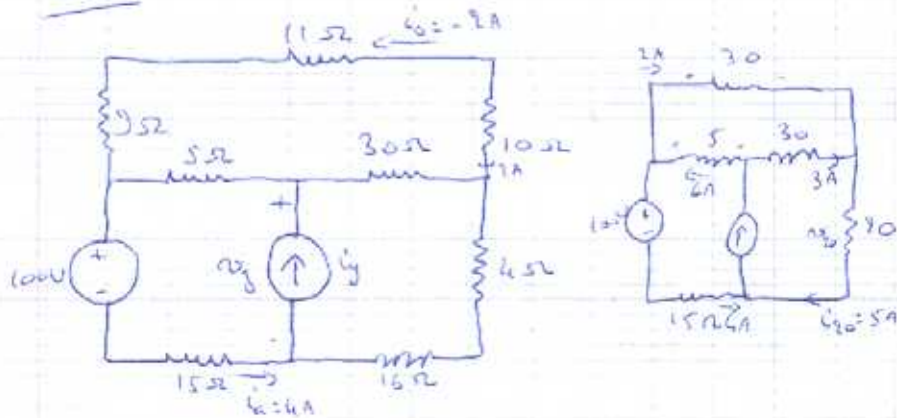
$i_g = 100 \text{ A}$  ✓

$p = -v_g \times i_g = -100 \times 80 = 80000 \text{ W}$

power delivered is 80000 W. ✓

2.15

10/10



a) KVL:  $-100 + 2 \times 30 + v_g - 4 \times 15 = 0$

$v_g = 100 \text{ V}$

$i_g = \frac{100}{40} = 2.5 \text{ A}$

$i_g = 4 + 5 = 9 \text{ A}$  ✓

b) 30 Ω resistor:  $p = 30 \times 2^2 = 120 \text{ W}$

16 Ω resistor:  $p = 400 \text{ W}$

11 Ω resistor:  $p = 11 \times 2^2 = 44 \text{ W}$

4 Ω resistor:  $p = 100 \text{ W}$

10 Ω resistor:  $p = 40 \text{ W}$

5 Ω resistor:  $p = 180 \text{ W}$

15 Ω resistor:  $p = 240 \text{ W}$

30 Ω resistor:  $p = 270 \text{ W}$  ✓

c)  $-v_g + 30 \times 3 + 20 \times 5 = 0$

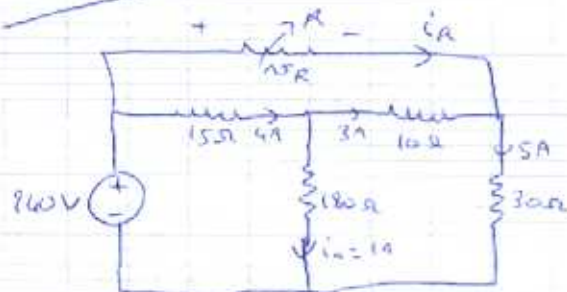
$v_g = 150 \text{ V}$  ✓

d)  $p = -150 \times 9 = -1350 \text{ W}$  ✓

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2.96

S/S



$$V_{180\Omega} = 180 \times 1 = 180V$$

$$V_{15\Omega} = 60V$$

$$i_{15\Omega} = \frac{60}{15} = 4A$$

$$V_{10\Omega} = \cancel{30} R i = 10 \times 3 = 30V \rightarrow \boxed{V_R = 30 + 60 = 90V}$$

$$V_{30\Omega} = 180 - 30 = 150V$$

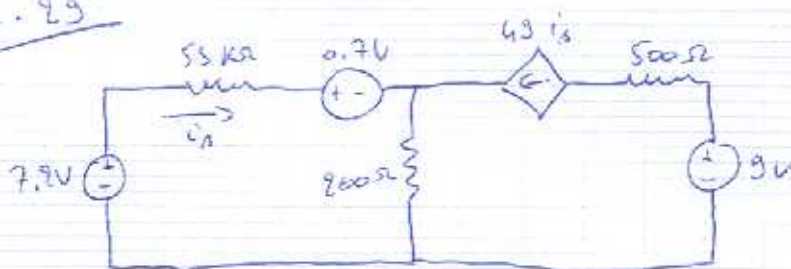
$$i_{30\Omega} = \frac{150}{30} = 5A$$

$$\boxed{i_R = 2A}$$

$$\boxed{R = \frac{90}{2} = 45\Omega} \quad \checkmark$$

2.99

F/F



$$KVL: -7.2 + 55 \times 10^3 i_A + 0.7 + 50 i_A \times 200 = 0$$

$$65 \times 10^3 i_A = 6.5$$

$$i_A = 0.1 \times 10^{-3} A = 0.1 \mu A$$

$$KVL: -9 + 500 \times 43 i_A + v_y + 50 i_A \times 200 = 0$$

$$-v_y = 26500 i_A + 10000 i_A - 9$$

$$v_y = -3.45 + 9 = \boxed{5.55V = v_y} \quad \checkmark$$

Power generated:  $p = -7.2 \times 0.1 \times 10^{-3} = -0.72 \times 10^{-3} \text{ W}$

$p = -5 \times 6.9 \times 10^{-3} = -34.5 \times 10^{-3} \text{ W}$

$\rightarrow -44.82 \times 10^{-3}$

Power absorbed:  $p = 55 \times 10^3 \times 0.1^2 \times 10^{-6} = 0.55 \times 10^{-3} \text{ W}$

$p = 0.7 \times 0.1 \times 10^{-3} = 0.07 \times 10^{-3} \text{ W}$

$p = 200 \times 25 \times 10^{-6} = 5 \times 10^{-3} \text{ W}$

$p = 500 \times 4.5 \times 10^{-6} = 2.25 \times 10^{-3} \text{ W}$

$p = 555 \times 4.9 \times 10^{-3} = 27.195 \times 10^{-3} \text{ W}$

$\rightarrow 44.82 \times 10^{-3}$

