

ENGR 065 - HW #5 - 2

Problem 3: $\frac{V_1 - V_2}{2} + \frac{V_1}{4} + \frac{V_3 - V_2}{2} + \frac{V_3}{8} = 0$

$$4V_1 - 4V_2 + 2V_1 + 4V_3 - 4V_2 + V_3 = 0$$

$$6V_1 + 5V_3 = 8V_2 - i$$

$$V_3 - V_1 = 30 - ii$$

$$\frac{V_2 - V_1}{2} + \frac{V_2 - V_3}{2} = 15 \Rightarrow 2V_2 - V_1 - V_3 = 30$$

$$2V_1 + V_3 = 120 - iv$$

$$V_1 = 30V$$

$$V_3 = 60V$$

Problem 4: $-12 - 4i_1 + 6i_2 = 0$
in loop $\Rightarrow 2i_3 - 6i_2 + 10 = 0$

$$i_1 = -0.81$$

$$i_2 = 1.45A$$

$$i_3 = -0.63A$$

① both sides

$$i_1 + i_2 + i_3 = 0$$

Problem 5: a) $-90V + 125I + 300(I - i_A) = 0$

$$\begin{cases} 125I + 300I - 300i_A = 40 \\ 425I - 300i_A = 40 \end{cases}$$

mesh 1

eqⁿ

Mesh(2): $300(i_A - I) + 75i_A + 25i_A = 0$

$$400i_A - 300I = 0$$

$$400i_A = 300I$$

$$i_A = \frac{300}{400}I = \frac{3}{4}I \Rightarrow I_A = 0.75I$$

$$85I - 60(0.75I) = 8$$

$$85I - 45I = 8 \Rightarrow I = 8/40 = 1/5 = 0.2 \text{amps}$$

$$i_A = (0.75 \cdot 0.2) = 0.15 \text{Amp}$$