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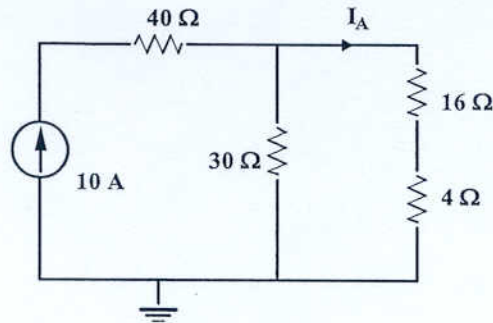
ECE 300
Spring Semester, 2007
Test #1

wlg Test A

Name Green
Print (last, first)

Work the exam on your own engineering paper. Work on one side of your paper only. Attach your work to the back of this exam sheet and staple in the top left hand corner. Each problem 20%.

(1) You are given the circuit of Figure 1. Find the current I_A .



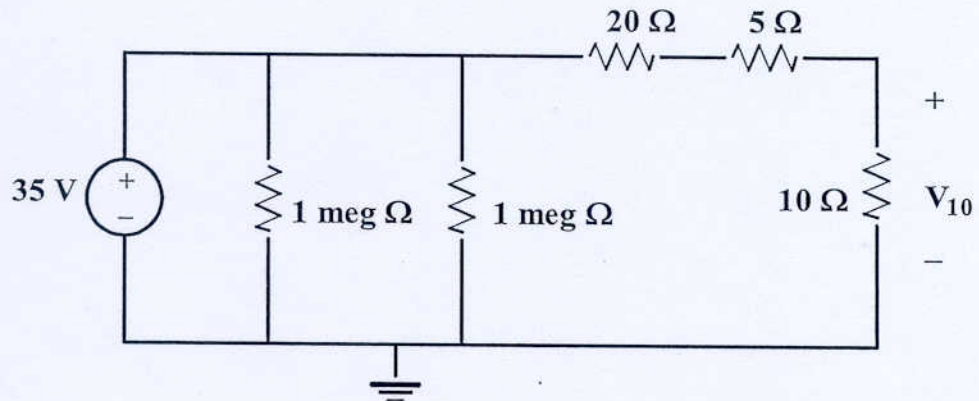
Using current division rule;

$$I_A = \frac{10 \times 30}{30 + 16 + 4}$$

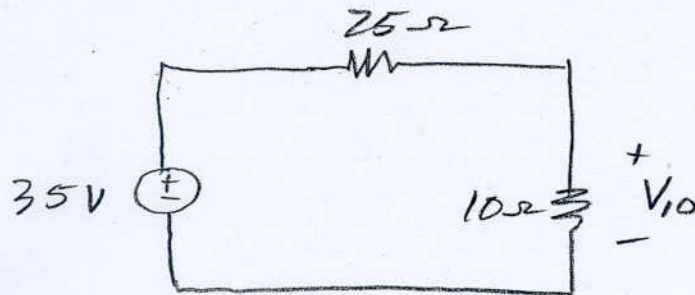
$$I_A = \frac{300}{50}$$

$I_A = 6 A$

(2) You are given the circuit of Figure 2. Find V_{10} .



The circuit reduces to,

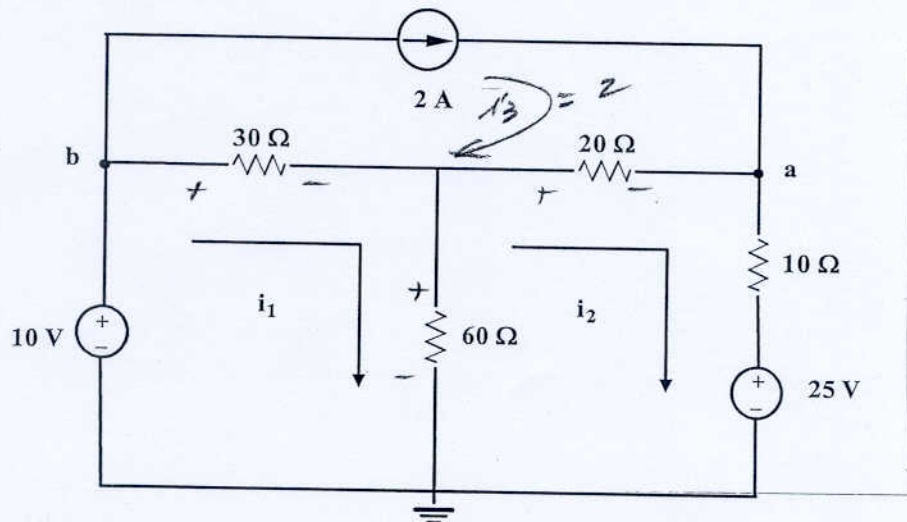


Using voltage division;

$$V_{10} = \frac{35 \times 10}{10 + 25}$$

$$V_{10} = 10V$$

- (3) You are given the circuit in Figure 3.
 (a) Use mesh analysis to find i_1 and i_2 .
 (b) Find V_{ab} .



mesh 1

(a)

$$-10 + 30(i_1 - 2) + 60(i_1 - i_2) = 0$$

$$\boxed{90i_1 - 60i_2 = 70}$$

mesh 2

$$-60(i_1 - i_2) + 20(i_2 - 2) + 10i_2 + 25 = 0$$

$$\boxed{-60i_1 + 90i_2 = 15}$$

$$\boxed{i_1 = 1.6 \text{ A}}$$

$$\boxed{i_2 = 1.233 \text{ A}}$$

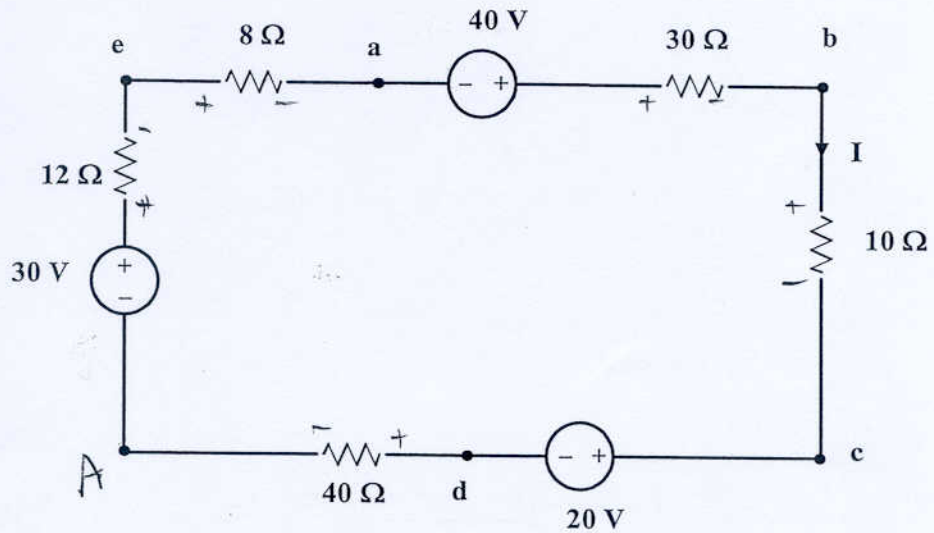
(b)

$$-V_{ab} + 10i_2 + 25 - 10 = 0$$

$$V_{ab} = 15 + 10i_2 = 15 + 10 \times 1.233$$

$$\boxed{V_{ab} = 29.33 \text{ V}}$$

- (4) You are given the circuit of Figure 4.
- Find I as indicated on the diagram.
 - Find V_{ed} .
 - Find the **power absorbed by** the $30\ \Omega$ resistor.
 - Find the **power supplied by** the $20\ \text{V}$ source.



KVL, start at A, go cw, use $\sum \text{drops} = 0$

$$(a) \quad -30 + 12I + 8I - 40 + 30I + 10I + 20 + 40I = 0$$

$$100I = 50$$

$$\underline{I = 0.5}$$

$$(b) \quad -V_{ed} - 12I + 30 - 40I = 0$$

$$V_{ed} = 30 - 52I = 30 - 26$$

$$\underline{V_{ed} = 4\ \text{V}}$$

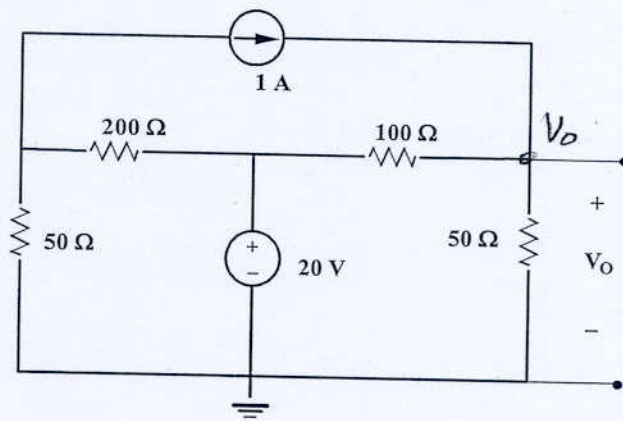
$$(c) \quad P_{30} = I^2 30 = (0.5)^2 30 = 7.5\ \text{W}$$

$$\underline{P_{30} = 7.5\ \text{W}}$$

$$(d) \quad P_{20\text{sup}} = -20I = -20 \times 0.5$$

$$\underline{P_{20\text{sup}} = -10\ \text{W}}$$

(5) Use nodal analysis to find V_o in the circuit of Figure 5.



At V_o

$$\frac{V_o - 20}{100} + \frac{V_o}{50} - 1 = 0$$

$$V_o - 20 + 2V_o - 100 = 0$$

$$3V_o = 120$$

$$V_o = 40 \text{ V}$$