



The Ohio State University  
Department of Electrical and Computer Engineering

**ECE 205**  
**Spring 2009**

Quiz #2

April 17, 2009

Name (print) \_\_\_\_\_

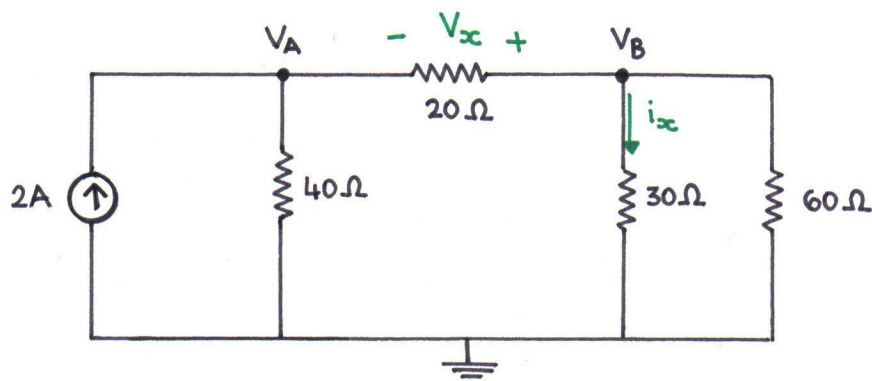
Grade \_\_\_\_\_

- Note -

- There is 1 problem on the following pages.
- Please read the questions carefully.

**“No aid is given, received or observed”**

**Signature** \_\_\_\_\_



- (1) FORMULATE THE NODE-VOLTAGE EQUATIONS
- (2) SOLVE THESE EQUATIONS AND FIND  $V_A$  AND  $V_B$
- (3) DETERMINE  $V_x$  AND  $i_x$

(1) NODE A :

$$\frac{V_A}{40} + \frac{V_A - V_B}{20} = 2$$

$$3V_A - 2V_B = 80$$

NODE B :

$$\frac{V_B - V_A}{20} + \frac{V_B}{30} + \frac{V_B}{60} = 0$$

$$-3V_A + 6V_B = 0$$

NODE VOLTAGE EQUATIONS

$$\begin{cases} 3V_A - 2V_B = 80 & (1) \\ -3V_A + 6V_B = 0 & (2) \end{cases}$$

(2) (1) + (2)  $\Rightarrow$   $4V_B = 80 \Rightarrow V_B = 20\text{ V}$

SUBSTITUTING IN (1)  $\Rightarrow$   $3V_A = 120 \Rightarrow V_A = 40\text{ V}$

(3)  $V_x = V_B - V_A = -20\text{ V}$

$$i_x = \frac{V_B}{30} = \frac{2}{3}\text{ A} = 0.667\text{ A}$$