

GEORGIA INSTITUTE OF TECHNOLOGY  
School of Electrical and Computer Engineering

EE 2250  
**Electric Circuit Analysis**

Quiz #1

Monday, January 25, 1999

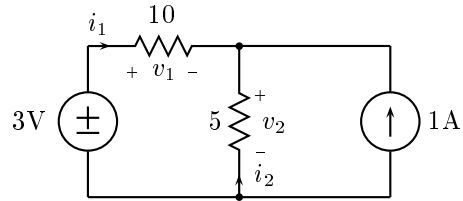
Name: \_\_\_\_\_

**GENERAL INSTRUCTIONS**

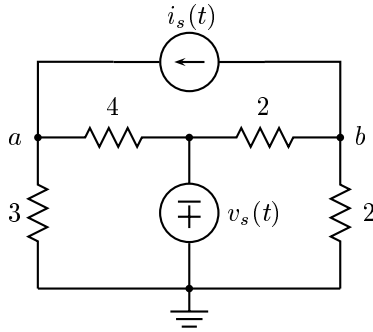
1. This is a *closed book, closed notes* exam. You may also use a calculator.
2. Please do all of your work on the exam itself. You may use the backs of the pages, if necessary.
3. Please be as neat and well organized as possible.
4. Clearly indicate your answers.

<i>Problem</i>	<i>Max</i>	<i>Score</i>
1	20	
2	20	
3	35	
4	25	
Total	100	

**Problem Q1.1:** In the circuit below both source waveforms (and all of the element variables) are constant. Compute the values of  $i_1$ ,  $v_1$ ,  $i_2$ , and  $v_2$ .



**Problem Q1.2:**



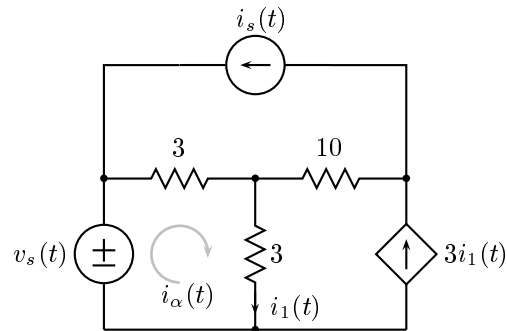
We propose to solve the above circuit using the node method.

- (a) Write the KCL equations at nodes  $a$  and  $b$  in terms of the node potentials at those nodes,  $e_a(t)$  and  $e_b(t)$ .
- (b) Put your equations in matrix-vector form by supplying the missing constants in the framework below.

$$\begin{bmatrix} \quad \\ \quad \end{bmatrix} \begin{bmatrix} e_a(t) \\ e_b(t) \end{bmatrix} = \begin{bmatrix} \quad \\ \quad \end{bmatrix} i_s(t) + \begin{bmatrix} \quad \\ \quad \end{bmatrix} v_s(t)$$

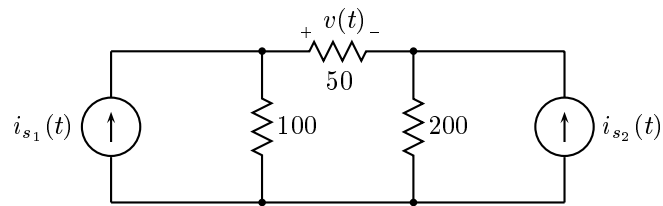
- (c) Solve them for  $e_a(t)$  and  $e_b(t)$ .

**Problem Q1.3:**



- How many meshes are present in the basic network?
- How many nodes are present in the basic network?
- Write a KVL equation over the indicated mesh of the complete network. Express your answer in terms of the mesh current  $i_\alpha(t)$ ,  $i_1(t)$ ,  $v_s(t)$ , and  $i_s(t)$ .
- Express  $i_1(t)$  as a function of  $i_\alpha(t)$ .
- Determine  $i_1(t)$  as a function of  $i_s(t)$  and  $v_s(t)$ .

**Problem Q1.4:**



- (a) Which method, the mesh method or the node method, will result in fewer equations to solve in order to determine  $v(t)$ ?
- (b) Determine  $v(t)$  using the method that you selected in (a).