

Name: Solution (please print)

Signature: \_\_\_\_\_

ECE 2201 – Quiz #3  
October 13, 2016

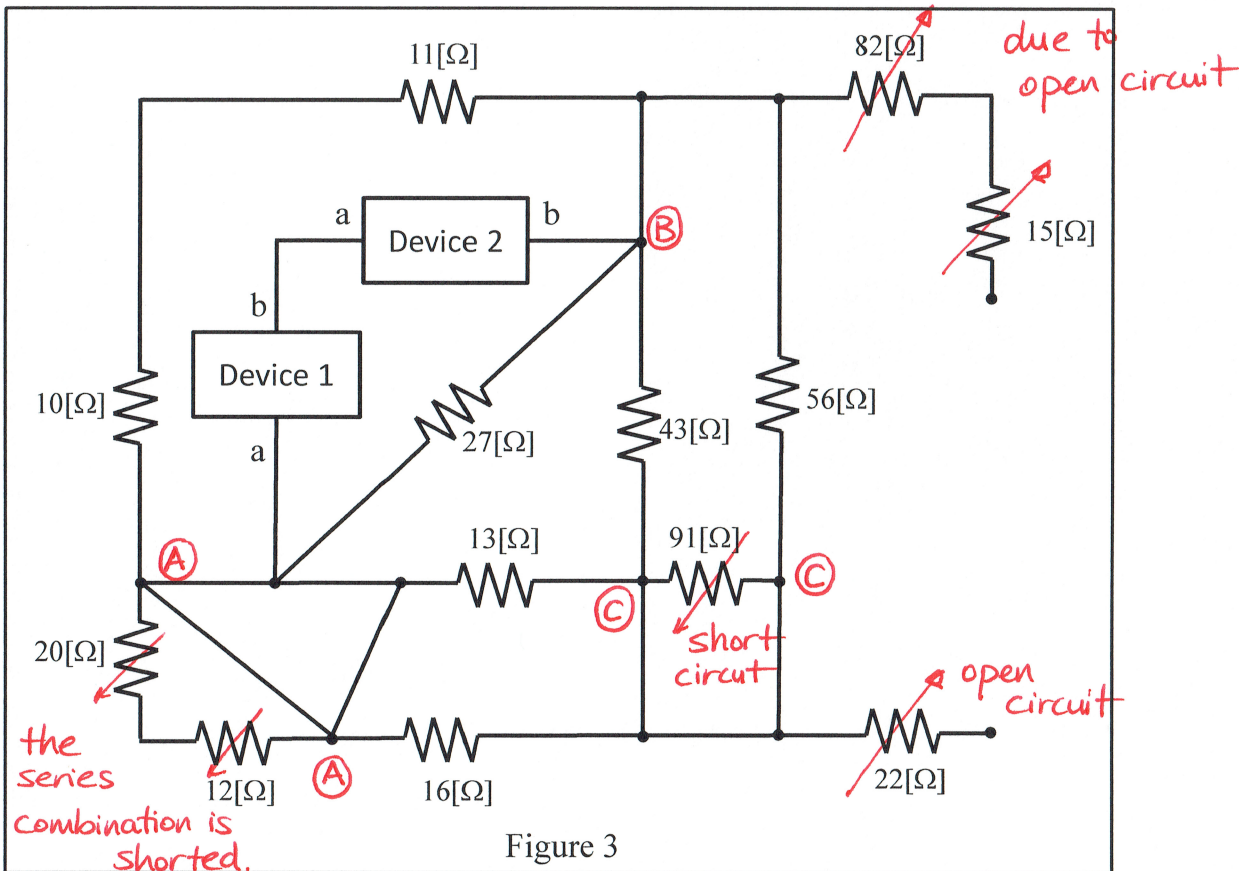
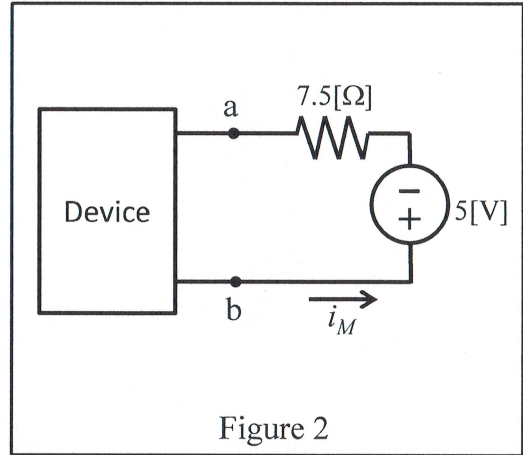
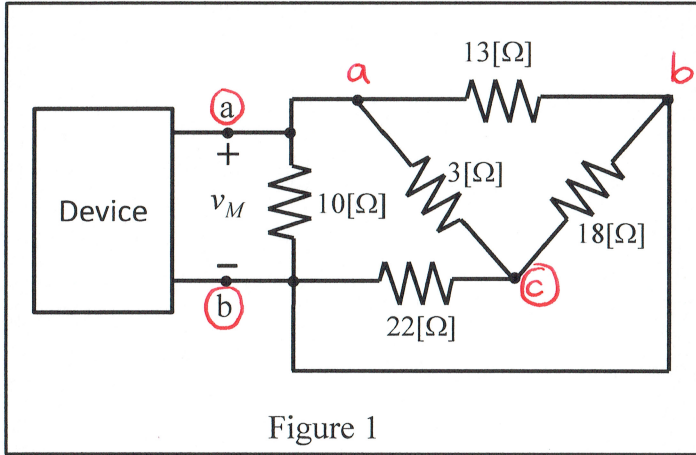
**Keep this quiz closed and  
face up until you are told to  
begin.**

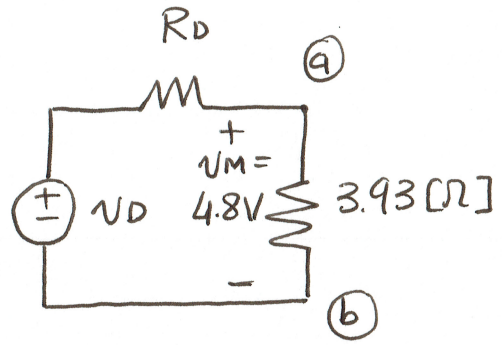
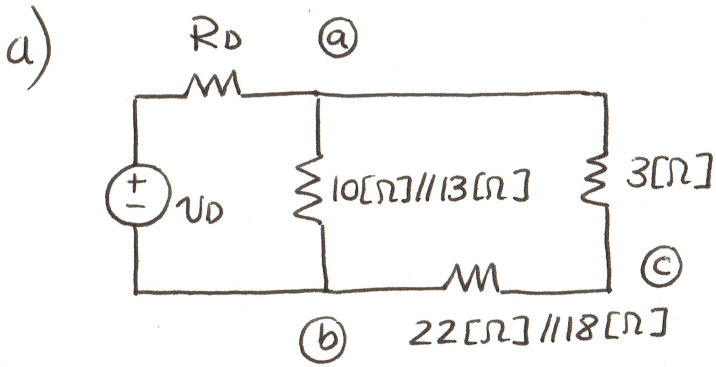
1. This quiz is closed book, closed notes. You may use one 8.5" x 11" crib sheet, or its equivalent.
2. Show all work on these pages. Show all work necessary to complete the problem. A solution without the appropriate work shown will receive no credit. A solution which is not given in a reasonable order will lose credit.
3. It is assumed that your work will begin on the same page as the problem statement. If you choose to begin your work on another page, you must indicate this on the page with the problem statement, with a clear indication of where the work can be found. **If your work continues on to another page, indicate clearly where your work can be found. Failure to indicate this clearly will result in a loss of credit.**
4. Show all units in solutions, intermediate results, and figures. Units in the quiz will be included between square brackets.
5. Do not use red ink. Do not use red pencil.
6. You will have 30 minutes to work on this quiz.

\_\_\_\_\_ /20

A device can be modeled using a voltage source in series with a resistor. This device was connected to the circuit shown in Figure 1, and a voltage of  $v_M = 4.8[V]$  is measured. The same device was then connected to the circuit shown in Figure 2, and a current of  $i_M = 1.3[A]$  is measured. Two identical versions of this device are connected to a circuit as shown in Figure 3.

- Find the device model, **showing** terminals **a** and **b**.
- Find the power delivered by **Device 1**.



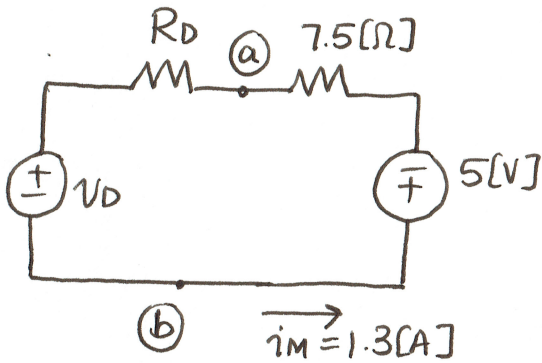


$$(1) -v_D + R_D \cdot \frac{4.8[V]}{3.93[\Omega]} + 4.8[V] = 0$$

$$22[\Omega] // 18[\Omega] = 9.9[\Omega]$$

$$10[\Omega] // 13[\Omega] = 5.652[\Omega]$$

$$5.652[\Omega] // (9.9[\Omega] + 3[\Omega]) = 3.93[\Omega]$$

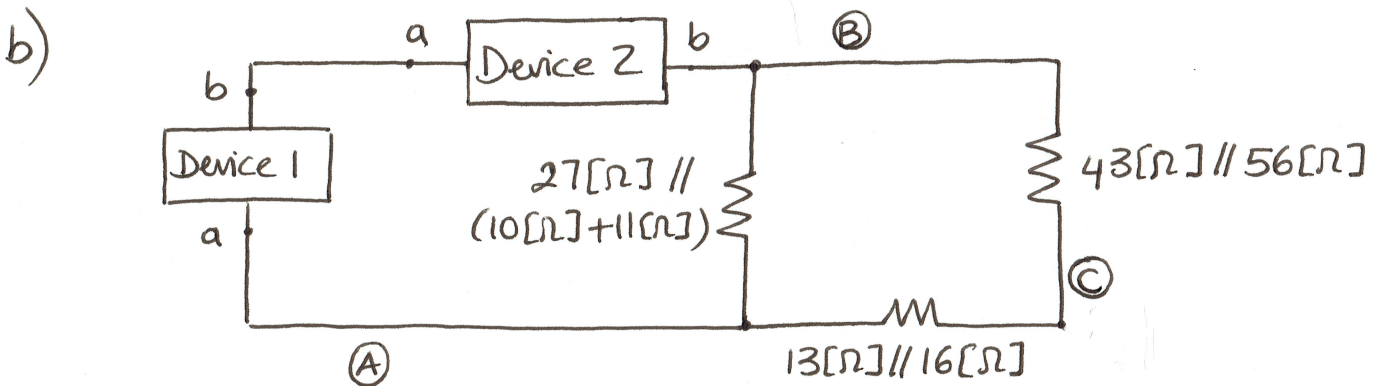
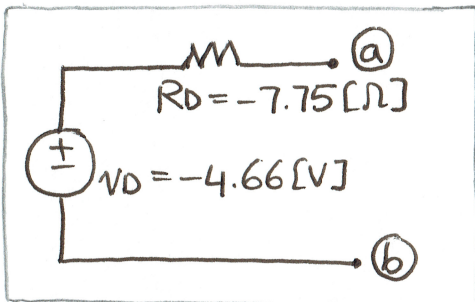


$$-v_D - 1.3[A]R_D - 1.3[A] \cdot 7.5[\Omega] - 5[V] = 0$$

$$-v_D - 1.3[A]R_D - 14.75[V] = 0 \quad (2)$$

Solving (1) and (2), we get:

$$R_D = -7.757[\Omega] \quad v_D = -4.66[V]$$

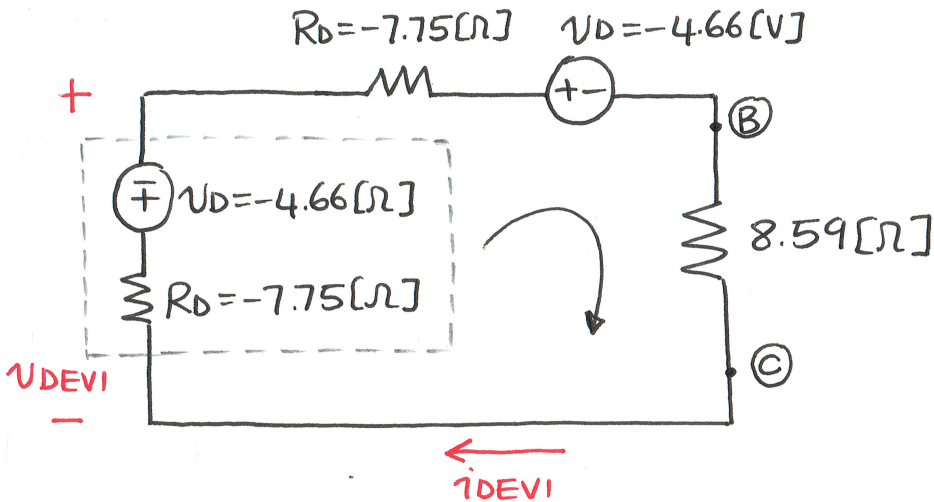


$$27[\Omega] \parallel (10[\Omega] + 11[\Omega]) = 11.81[\Omega]$$

$$13[\Omega] \parallel 16[\Omega] = 7.17[\Omega]$$

$$43[\Omega] \parallel 56[\Omega] = 24.32[\Omega]$$

$$(7.17[\Omega] + 24.32[\Omega]) \parallel 11.81[\Omega] = 8.59[\Omega]$$



$$(2R_D + 8.59[\Omega]) i_{DEVI} + 2v_D = 0$$

$$i_{DEVI} = \frac{-2v_D}{2R_D + 8.59[\Omega]} = \frac{-2(-4.66[V])}{2(-7.75[\Omega]) + 8.59[\Omega]} = -1.35[A]$$

$$v_{DEVI} = -v_D - R_D \cdot i_{DEVI} = -5.8[V]$$

$$P_{DEL, DEVICEI} = v_{DEVI} \times i_{DEVI} = \boxed{7.83 [W]}$$