Closed book/notes, calculators allowed up to level of TI89, HP50.

Part I: 8 questions
Part II: 8 questions
Part II is worth twice as much as Part I.

On the SCANTRON write and bubble-in your:

1. Name (Last, first)

2. Write the color of your exam paper (IVORY or GREEN) on the top left margin of the SCANTRON.

Show your UA picture ID card when you turn in your exam.

All work should be done on the examination paper. Allow for reasonable amounts of roundoff error, and carefully mark one choice for each problem on the SCANTRON answer sheet.

All answer sheets and examinations will be collected at 10:30. You will be asked to stop writing and hand in your papers/answer sheets. Failure to comply promptly may result in disqualification from the exam.

NAME: ________________________________

SIGNATURE: _________________________
Part I.

1. Let $p_1$ and $p_2$ be the power absorbed by the resistor $R$ in circuit 1 and circuit 2, respectively. The values of $v_s$ (and $R$) are equal in the two circuits. Which statement is correct?

   a) $p_1 > p_2$
   b) $p_1 = p_2$
   c) $p_1 < p_2$
   d) not enough information given
   e) none of these

2. 'Tera' means

   a) $10^3$
   b) $10^6$
   c) $10^9$
   d) $10^{12}$
   e) none of these

3. What is the equivalent resistance as seen from the nodes marked $a$ and $b$?

   a) $500 \, \Omega$
   b) $1 \, k\Omega$
   c) $2 \, k\Omega$
   d) $4 \, k\Omega$
   e) none of these

4. What are the correct expressions for Ohm's law and power absorbed for the given circuit fragment?

   a) $v = iR$, $p = i^2R$
   b) $v = iR$, $p = -i^2R$
   c) $v = -iR$, $p = i^2R$
   d) $v = -iR$, $p = -i^2R$
   e) none of these
5. What is the power absorbed by the 4 $k\Omega$ resistor?

a) 16 mW  
b) 8 mW  
c) 64 mW  
d) 32 mW  
e) none of these

6. Find the value of the voltage $v$

a) 8 V  
b) 4 V  
c) 2 V  
d) not enough information given  
e) none of these

7. What value of $R$ results in $v = 0$?

a) 5 $\Omega$  
b) 10 $\Omega$  
c) 15 $\Omega$  
d) 20 $\Omega$  
e) none of these

8. Find $i$

a) 0.5 mA  
b) 1 mA  
c) 2 mA  
d) 4 mA  
e) none of these
Part II.

9. Find the total energy delivered by the voltage source.

a) 0.4 mJ  
b) 0.8 mJ  
c) 1.6 mJ  
d) 3.2 mJ  
e) none of these
10. Find the power delivered by the controlled source.

a) $-4 \text{ mW}$
b) $8 \text{ mW}$
c) $-16 \text{ mW}$
d) $32 \text{ mW}$
e) none of these
11. Find $i$.

a) $2.5 \text{ mA}$
b) $5 \text{ mA}$
c) $10 \text{ mA}$
d) not enough information given
e) none of these
12. Find \( v \).

a) \(-1\) V  
b) \(1\) V  
c) \(3\) V  
d) \(-5\) V  
e) none of these
13. Find $v$.

a) 18 V  
b) 9 V  
c) 5 V  
d) 2 V  
e) none of these
14. Find the equivalent resistance at terminals $a, b$ (i.e., $R_{ab}$).

a) 2 Ω  
b) 4 Ω  
c) 6 Ω  
d) 8 Ω  
e) none of these
15. The voltmeter below is to be designed for a full scale reading of 300 mV. The meter movement has $i_{\text{max}} = 2 \text{ mA}$, and internal resistance $R_d = 75 \Omega$. Find the equivalent resistance $R_{ab}$ of the resulting voltmeter.

a) 75 $\Omega$

b) 150 $\Omega$

c) 300 $\Omega$

d) 600 $\Omega$

e) none of these
16. Find $v_{ab}$.

a) 2 V  
b) 4 V  
c) 6 V  
d) 8 V  
e) none of these
Answers:

1) b
2) d
3) b
4) c
5) a
6) b
7) c
8) c
9) c
10) b
11) b
12) d
13) a
14) b
15) b
16) d