

PY111 Practice Midterm 2

NAME:

LAST FOUR DIGITS OF SSN:

Answer in the space provided. You may use the backs of sheets if required. Box your answers on questions 2 and 3. There are 30 possible points in this midterm.

written response

1. Does it make sense to separate the world into conductors and insulators?

partial credit questions

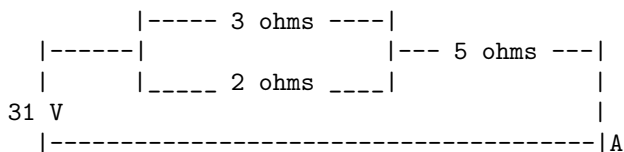
2. An electron is accelerated from rest through a potential of 10,000 V and sent down a long evacuated tube which has a target of charge $-6 \mu\text{C}$ at the end. Determine how close the electron gets to the target.

3. An electric field does 5.8 mJ of work in moving a charge with $q = +3\mu\text{C}$ from A to B.

- (a) What is the value of $EPE_A - EPE_B$?
- (b) Determine $V_A - V_B$.
- (c) Is A or B at higher potential?

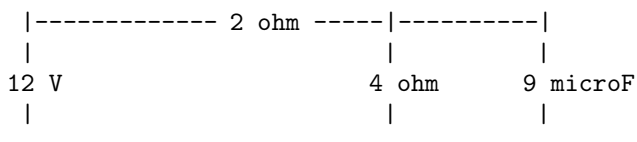
multiple choice questions

4. Determine the current through the 2 ohm resistor.



- (a) 2 A
- (b) 3 A
- (c) 1 A
- (d) 4 A

5. Determine the charge on the capacitor after it has fully charged.



- (a) $36 \mu C$
- (b) $72 \mu C$
- (c) $18 \mu C$
- (d) $180 \mu C$

6. A cardiologist doubles the length of a copper wire feeding artificial heart, what happens to the wire's resistance?

- (a) halves
- (b) stays the same
- (c) doubles
- (d) quadruples

7. An electric space heater has been brought into the ER in an attempt to keep patients from freezing. If it is made of wire with a resistance on 12 ohms and is plugged into a 115V AC outlet, how much heat is added to the room in two minutes?

- (a) 8 kJ
- (b) 66 kJ
- (c) 2200 J
- (d) 1100 J
- (e) 0.13 MJ

8. If a capacitor stores $5 \cdot 10^{-4}$ J of energy when attached to 10 V battery, how much does it store when attached to a 20 V battery?

- (a) 2 mJ
- (b) 20 mJ
- (c) 1 mJ
- (d) 0.5 mJ

equations

$$W_{AB} = EPE_A - EPE_B \quad qV = EPE \quad V = kq/r$$

$$E = -\frac{\Delta V}{\Delta s} \quad q = CV \quad \kappa = E_0/E \quad C = \kappa\epsilon_0 A/d$$

$$E = \frac{1}{2}CV^2 \quad E = \frac{1}{2}\kappa\epsilon_0 E^2 \quad I = \frac{\Delta q}{\Delta t} \quad V = IR \quad R = \rho L/A \quad P = IV$$

$$\begin{aligned}
\bar{P} &= I_{rms} V_{rms} & V &= V_0 \sin 2\pi ft & R_{eq} &= R_1 + R_2 + \dots & 1/R_{eq} &= 1/R_1 + 1/R_2 + \dots \\
C_{eq} &= C_1 + C_2 + \dots & 1/C_{eq} &= 1/C_1 + 1/C_2 + \dots & q &= q_0(1 - e^{-t/RC}) & q &= q_0 e^{-t/RC} \\
\epsilon_0 &= 8.85 \cdot 10^{-12} C^2/N \cdot m^2 & q_e &= -1.6 \cdot 10^{-19} C & m_e &= 9.1 \cdot 10^{-31} kg & k &= 8.99 \cdot 10^9 N \cdot m^2/C^2
\end{aligned}$$