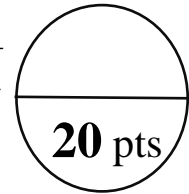




NAME: _____ LRN: _____
CLASS TIME: _____ SIGNATURE: _____



GPhys 122 **Online Quiz # 2**
March 20, 2020 9:00AM

*For those students who can submit online **on or before** the extended deadline @ 8:00AM March 21, 2020, choose only **Two in Problem A and Two in Problem B** (if you answered all, it's OK, I'll choose only your correct answers). Beyond 8:00AM or until resume of classes, **SOLVE ALL**. Your score are based on your answers. The lowest score can be obtain is 3pts out of 20pts.*

General Note:

- All solutions to be problem should be **HAND WRITTEN** and **STEP-BY STEP**.
- Use **band paper and black pen** for your solutions.
- Write your complete name, subject, class time, course/track, & affixed your signature on each of the solution papers.
- Use your own email account (with surname) in sending your solutions. Make sure files are properly attached.
- Send your solutions to email: mfsacedon@gmail.com

A. ELECTRIC CURRENT PROBLEMS

Problem 1: An 18-gauge copper wire (diameter 1.02 mm) carries a current with a current density of 3.20×10^6 A/m². The density of free electrons for copper is 8.5×10^{28} electrons per cubic meter. Calculate (a) the current in the wire and (b) the drift velocity of electrons in the wire.

Problem 2: You want to produce three 1.20-mm-diameter cylindrical wires, each with a resistance of 1.00Ω at room temperature. One wire is gold, one is copper, and one is aluminum. (a) What will be the length of each wire? (b) Gold has a density of 1.93×10^4 kg/m³. What will be the mass of the gold wire? If you consider the current price of gold, is this wire very expensive?

Problem 3: A 5.00-A current runs through a 12-gauge copper wire (diameter 2.05 mm) and through a light bulb. Copper has 8.5×10^{28} free electrons per cubic meter. (a) How many electrons pass through the light bulb each second? (b) What is the current density in the wire? (c) At what speed does a typical electron pass by any given point in the wire? (d) If you were to use wire of twice the diameter, which of the above answers would change? Would they increase or decrease?

B. RESISTIVITY, RESISTANCE, AND OHM'S LAW PROBLEMS

Problem 4: A current-carrying gold wire has diameter 1mm. The electric field in the wire is 0.60 V/m. What are (a) the current carried by the wire; (b) the potential difference between two points in the wire 7 m apart; (c) the resistance of a 7-m length of this wire?

Problem 5: A 14-gauge copper wire of diameter 1.628 mm carries a current of 12.5 mA. (a) What is the potential difference across a 2.00-m length of the wire? (b) What would the potential difference in part (a) be if the wire were silver instead of copper, but all else were the same?

Problem 6: (a) What is the resistance of a Nichrome wire at 0.0°C if its resistance is 100.00Ω at 11.5°C? (b) What is the resistance of a carbon rod at 27°C if its resistance is 0.0160Ω at 0.0°C?

Problem 7: A 14-gauge copper wire of diameter 1.628 mm carries a current of 12.5 mA. (a) What is the potential difference across a 2.00-m length of the wire? (b) What would the potential difference in part (a) be if the wire were silver instead of copper, but all else were the same?

----- GOD BLESS YOU -----

TABLE Resistivities at Room Temperature (20°C)						
Substance		ρ ($\Omega \cdot \text{m}$)	Substance		ρ ($\Omega \cdot \text{m}$)	
Conductors			Semiconductors			
Metals	Silver	1.47×10^{-8}	Pure carbon (graphite)	3.5×10^{-5}		
	Copper	1.72×10^{-8}	Pure germanium	0.60		
	Gold	2.44×10^{-8}	Pure silicon	2300		
	Aluminum	2.75×10^{-8}	Insulators			
	Tungsten	5.25×10^{-8}	Amber	5×10^{14}		
	Steel	20×10^{-8}	Glass	$10^{10} - 10^{14}$		
	Lead	22×10^{-8}	Lucite	$> 10^{13}$		
	Mercury	95×10^{-8}	Mica	$10^{11} - 10^{15}$		
	Alloys	Manganin (Cu 84%, Mn 12%, Ni 4%)	44×10^{-8}	Quartz (fused)	75×10^{16}	
		Constantan (Cu 60%, Ni 40%)	49×10^{-8}	Sulfur	10^{15}	
Nichrome		100×10^{-8}	Teflon	$> 10^{13}$		
			Wood	$10^8 - 10^{11}$		

TABLE Temperature Coefficients of Resistivity (Approximate Values Near Room Temperature)			
Material	α [(°C) ⁻¹]	Material	α [(°C) ⁻¹]
Aluminum	0.0039	Lead	0.0043
Brass	0.0020	Manganin	0.00000
Carbon (graphite)	-0.0005	Mercury	0.00088
Constantan	0.00001	Nichrome	0.0004
Copper	0.00393	Silver	0.0038
Iron	0.0050	Tungsten	0.0045