United International University

School of Science and Engineering

Quiz#05; Year 2020; Semester: Fall
Course: PHY 105; Title: Physics
Full Marks: 20; Section: C; Time: 20 minutes

Name:	ID:	Date:

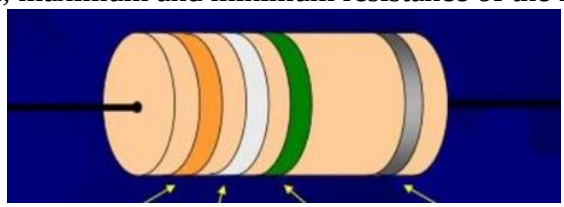
1. What is terminal voltage? What is the difference between terminal voltage and emf? **1**

2. What is rms voltage? What is its unit? **0.5**

3. An aluminium ($^{26.98}_{13}Al$) wire 5.2 mm in diameter carries a 7.0 mA current. Determine (i) the current density in the wire, (ii) the drift velocity of the free electrons, and (c) the rms speed of electrons assuming they behave like an ideal gas at 35°C. Assume that one electron per *Al* atom is free to move (the others remain bound to the atom). The conduction electron number density in aluminium is 3.8×10^{21} electrons/m^3. [Given, $e=1.6\times10^{-19}$ C, $m_e=9.1\times10^{-31}$ kg, $K_B=1.38\times10^{-23}$ J/K, R=8.31 J/K-mol] **2.5**

4. A current of 16 mA is passing through a copper wire. Determine the (i) resistivity of a 6 m length of copper wire having a diameter of 4 cm and resistance 78 mΩ, (ii) conductivity, and (iii) electric power. Assume the temperature inside the wire is 20°C. **2.5**

5. Find out the nominal, maximum and minimum resistance of the following resistor? **1**



6. Find the currents (i) I, $I_{1\ (24\Omega)}$, I_2 and I_3 and the voltage V_x across 200 Ω, and (ii) terminal voltage of the battery in the circuit shown below? **2.5**