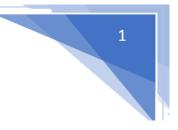**Al-Mustaqbal University / College of Engineering & Technology**
Department (Communications Technologies Engineering)
Class (First)
Subject (Physics and Semi-conductor) / Code (ATU11105)
Lecturer (Prof.Dr.Haider J Abd)
1ˢᵗ term – Lecture No. & Lecture Name (Tutorial : Sheet 2)

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Sheet No2 "Tutorial"

Note: It is important to underscore the importance of understanding the units used for a quantity. The units of measurement are *electron volts* (eV). The unit of measure is appropriate because $W \text{ (energy)} = QV$ (as derived from the defining equation for voltage: $V = W/Q$). Substituting the charge of one electron and a potential difference of 1 V results in an energy level referred to as one electron volt.

$$W = QV$$
$$= (1.6 \times 10^{-19} \, C)(1 \, V)$$
$$= 1.6 \times 10^{-19} \, J$$

$$1 \, eV = 1.6 \times 10^{-19} \, J$$

Q1: (a) How much energy in joules is required to move a charge of 12 mC through a difference in

potential of 6 V?

b. For part (a), find the energy in electron-volts.

Q2. If 48 eV of energy is required to move a charge through a potential difference of 3.2 V, determine

the charge involved.

Q3. Describe the difference between n-type and p-type semiconductor materials.

Q4. Describe the difference between donor and acceptor impurities.

Q5. Describe the difference between majority and minority carriers.

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