Week 1 Quiz: Material Properties
ECE 305: Semiconductor Devices

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Answer the **multiple choice questions** below by choosing the **one, best answer**.

1) Common semiconductors come from which column(s) of the periodic table?
   a) Column II
   b) Column III
   c) Column IV
   d) Column V
   e) Any combination of columns II to VI as long as the average column number is 4.

Note: the overwhelming majority of transistors are made from Si, a column 4 element, but other materials are important. Every cell phone has GaAs transistors for RF, and light-emitting diodes cannot be made from Si – they use II-VI and III-V semiconductors.

2) Silicon crystalizes in what type of lattice?
   a) Silicon
   b) Diamond
   c) Zincblende
   d) Face centered cubic
   e) Body centered cubic

Note: the diamond lattice is just like the zincblende lattice except that all the atoms are of the same kind. GaAs, for example, crystalizes in the zincblende lattice.

3) What column of the periodic table is Si in?
   a) II
   b) III
   c) IV
   d) V
   e) IV

4) What name is associated with the notation (100)?
   a) Shockley
   b) Moore
   c) Noyce
   d) Grove
   e) Miller

Week 1 Quiz continued

5) How many Joules in an electron volt?
   a) 1
   b) 9.11×10^{-31}
   c) 1.38×10^{-23}
   d) 6.63×10^{-34}
   e) 1.6×10^{-19}

Note: If we are using SI (MKS) units, then we must express energy in Joules, but we'll find it convenient to express energies in eV. Energies in eV must be converter to Joules to use them in equations with MKS units.

6) What is $\hbar$ (hbar)?
   a) Stefan-Boltzmann constant
   b) Stefan-Boltzmann constant multiplied by two pi
   c) Plank's constant
   d) Plank's constant divided by two pi
   e) Plank's constant multiplied by two pi

7) The Miller indices of a plane normal to the y-axis are:
   a) (001)
   b) [001]
   c) (010)
   d) [010]
   e) (110)

8) Which of the following is true about the conduction (valence) band?
   a) It is mostly full (empty) of electrons
   b) It is mostly empty (full) of electrons
   c) Both are exactly half full of electrons
   d) Both are mostly empty of electrons
   e) Both are mostly full of electrons