ECE 340: Quiz

Name:_____

The table below is the portion of the periodic table of elements for semiconductor materials:

| II | III | IV | V | VI |
|---|---|---|---|---|
| | B | C | N | |
| | Al | Si | P | S |
| Zn | Ga | Ge | As | Se |
| Cd | In | | Sb | Te |

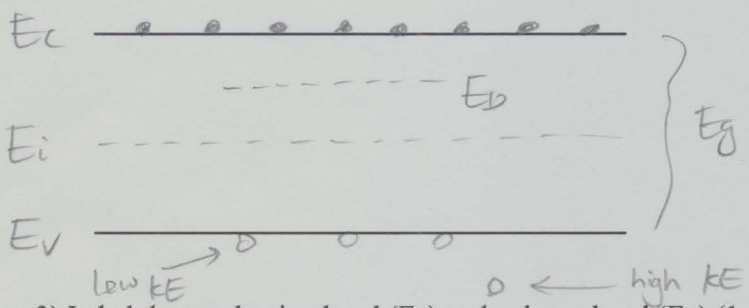
Consider a silicon sample that is doped with phosphorous (P):

1) Is the material n or p-type? (1 point) n-type

2) Justify your answer. (1 points)

P atom has one more electron than Si

The two lines below represent the conduction band and the valence band of a Si semiconductor:




3) Label the conduction band ($E_C$) and valence band ($E_V$) (1 point).

Indicate schematically the following:

4) The position of the intrinsic level ($E_i$), the position of the ~~arsenic~~ phosphorous (P) level ($E_D$, if it is a donor; $E_A$, if it is an acceptor). (2 points)

5) The energy gap. (1 point)

6) The electrons by solid dots ●, and the holes by open dots ○. (2 points)

7) A hole with high kinetic energy and a hole with low kinetic energy. (1 point)

8) Are there more electrons or holes? Why? (1 points)

more electrons. n-doped with phosphorous.