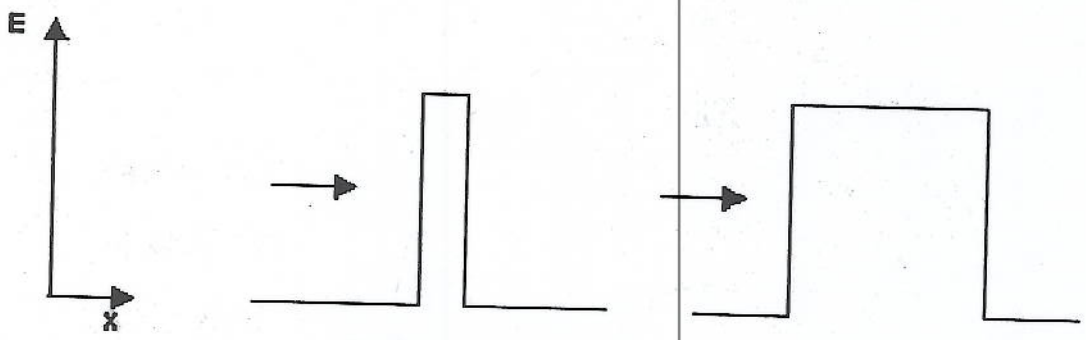
NAME:

ECE344 Semiconductor Devices
Fall 2008

QUIZ-1

Question 1
Consider quantum mechanical particles incident from the left having well-defined energy as indicated by the vertical position of the arrows, in the two systems shown below. Will the probability of being reflected greater for the incident particle in System 1 than for the incident particle in System 2 ?
Circle one choice below:

Yes / (No) / not enough information provided



System 1 **System 2**

Question 2
If the photoelectric effect were governed by classical physics rather than quantum mechanics, what would happen in the experiments below:

a- By changing the intensity of the incident radiation, what would happen to the energy of the extracted electrons ?

if intensity ↗ , energy of extracted e^- ↗
if intensity ↘ energy of extracted e^- ↘

b- How about changing the frequency of the light ?

Nothing will happen. The energy of e^- would be independent of the frequency of the light.

Question 3

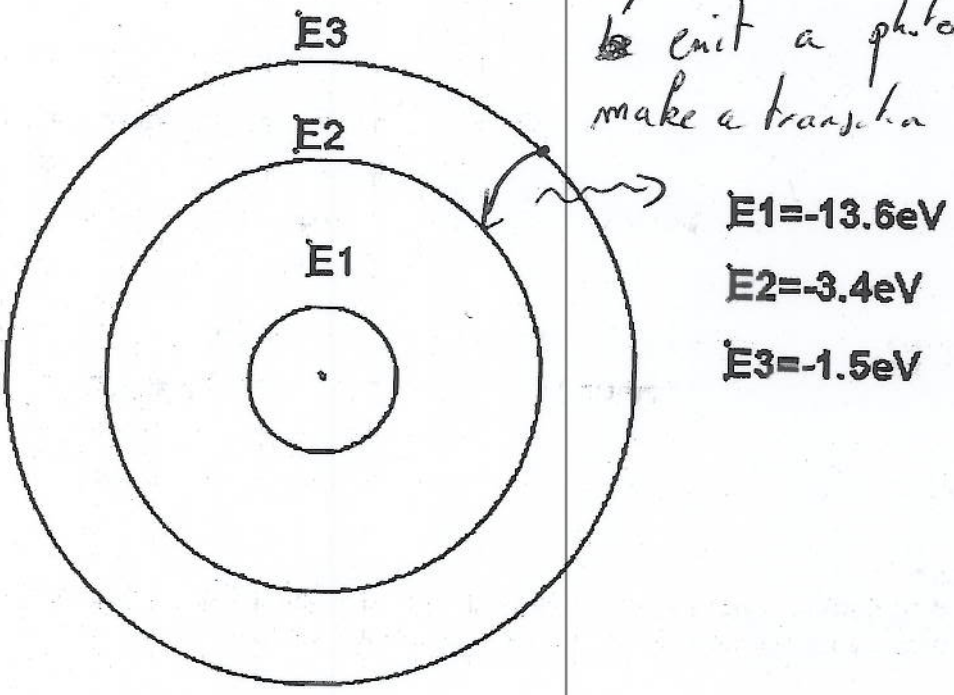
Consider the Hydrogen atom below (where the first three energy levels are represented).

a- Starting at equilibrium, what would happen if an incoming photon hits the atom with energy +10ev ?

Nothing - e^- would not have enough energy to jump to second orbit.

b- suppose that a photon with energy +1.9eV is emitted from the atom, can you describe what happened ?

Since $E_3 - E_2 = 1.9eV$. This means that the e^- initially in the 3rd orbit should emit a photon and make a transition to second orbit.



Question 4

What does the formula $p=\hbar k$ mean ?

Circle one choice below:

Uncertainty principle

Pauli-exclusion principle

quantization of the electromagnetic radiation

duality wave-particle