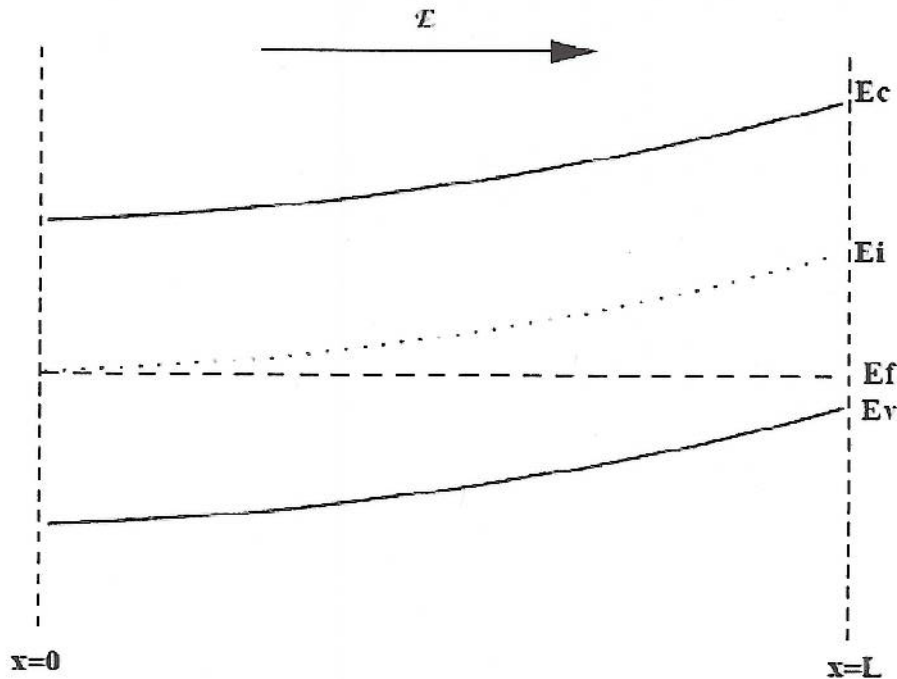


NAME:

ECE344 Semiconductor Devices
Fall 2008

QUIZ-3

A silicon device maintained at 300K is characterized by the following energy band diagram:



3.5/4
Question 1 (ATTENTION: +0.5pts by correct answers but -0.5pts for wrong answers!)

Circle ALL the correct answers:

- a- The hole concentration is higher in $x=0$ than in $x=L$
- b- The electron concentration is higher in $x=0$ than in $x=L$
- c- The doping concentration is higher in $x=L/2$
- d- It is a non-uniformly doped semiconductor with acceptors
- e- It is a non-uniformly doped semiconductor with donors
- f- It is a uniformly doped P-type semiconductor
- g- the semiconductor material is in equilibrium
- h- The semiconductor material is in non-equilibrium
- i- $p \approx N_a$ in $x=L$
- j- $n \approx N_d$ in $x=0$
- k- $N_d + p = N_a + n$ in $x=L$
- l- $p = n_i$ in $x=0$
- m- $n = n_i^2 / p$ in $x=L/2$

1.5/1 Question 2

Why the direction of the electric field is going from the left to the right ?

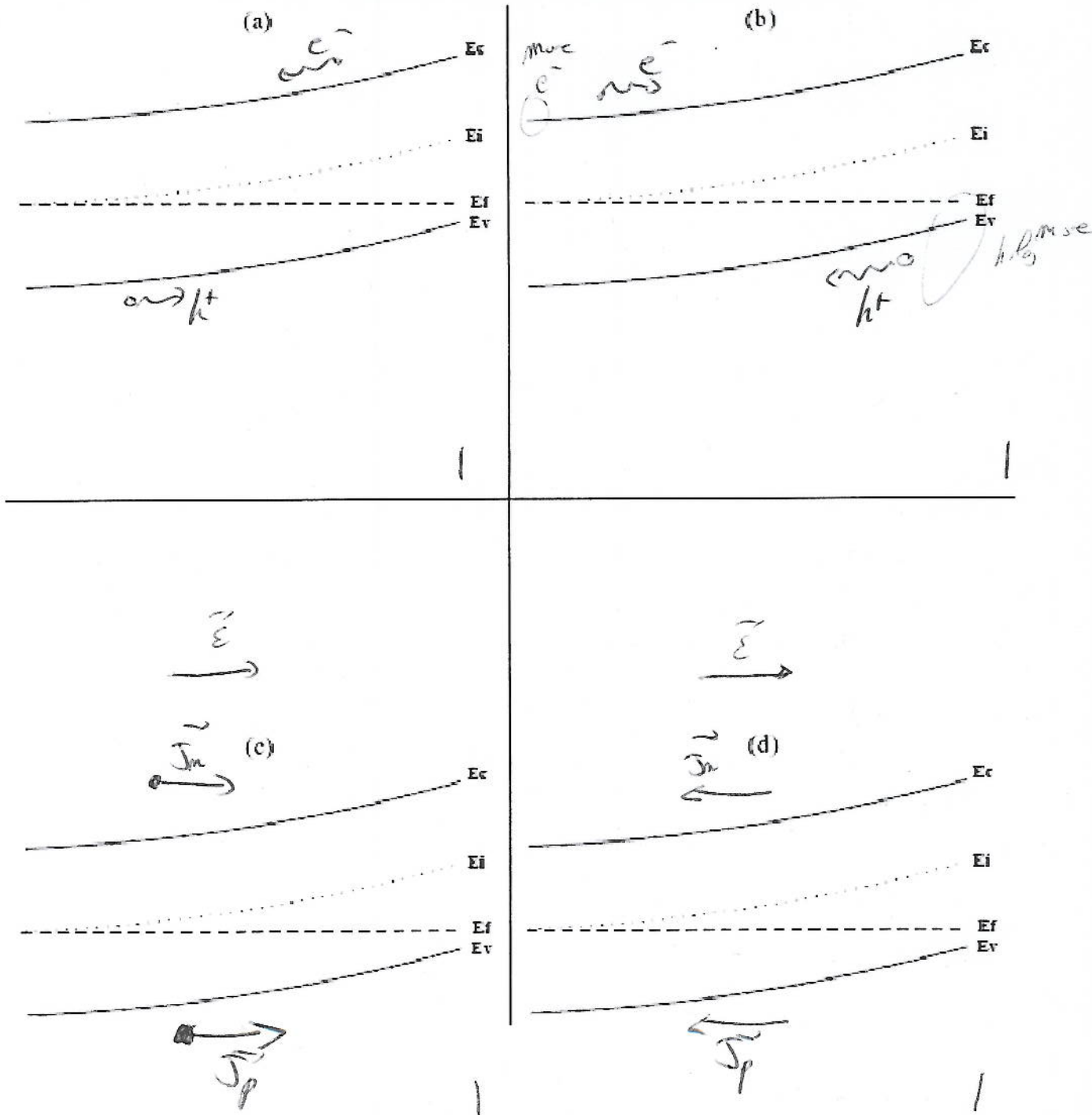
• the slope of E_c , E_v and E_i is positive ($E = \frac{1}{q} \frac{d\phi}{dx}$)

OR • Looking at the direction of the \vec{E} drift from high potential to low potential.
 $\Rightarrow \vec{E}$ is going in the other direction

5/1

Question 3 (0.5 points by correct directions and +1 point if everything right)

In the following diagrams, represent for BOTH electrons and holes in (a) the directions of the carrier drift, in (b) the directions of the carrier diffusion, in (c) the directions of the drift current, in (d) the directions of the diffusion current.



(+1)