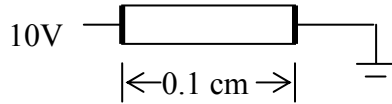


ECSE-2210 Microelectronics Technology
Class Activity 6

1. Short Answer Questions.

(a) What is the electric field inside the Si bar shown below? What is its direction?



(b) How long does it take on average for an electron to drift $1 \mu\text{m}$ in pure Si with an applied electric field of 100 V/cm ?

(c) Repeat (b) for 10^5 V/cm . Explain why you cannot use the relationship $v_d = \mu E$ here.

(d) An average hole drift velocity of 10^3 cm/s results when 2 V are applied across a 1 cm long semiconductor bar. What is the hole mobility inside the bar?

(e) For a given semiconductor the carrier mobilities in the intrinsic material are (choose one: higher than, lower than, the same as) those in heavily doped material. Explain why?

(f) Name two dominant carrier scattering mechanisms in non-degenerately doped semiconductor of device quality.

(g) In the diagram below, 100 million electrons cross the marked area A from left to right every 1 microsecond. What is the value of the current in A , and its direction?

