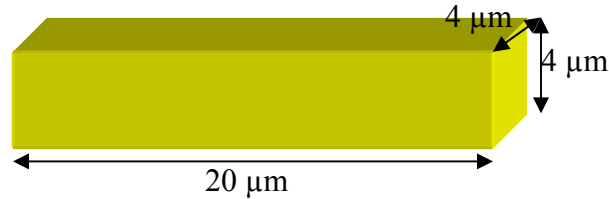


COE 360 – 1st Assignment – Dr. Muhammad Elrabaa

- 1) The following piece of Si is doped with 10^{17} cm^{-3} doners and $2 \times 10^{15} \text{ cm}^{-3}$ acceptors:
 - a. Calculate the electron and hole concentrations, what is the type of this semiconductor?
 - b. Calculate the resistance of this piece of Si
 - c. What is the type of doping and its concentration required to invert the type of this piece of Si while keeping the resistance the same?



- 2) A P-N junction is made of Silicon that is doped with 10^{16} cm^{-3} doners at one side and $2 \times 10^{15} \text{ cm}^{-3}$ acceptors at the other side:
 - a. Calculate the resistance of each side (the N and P sides)
 - b. Calculate the built-in potential
 - c. If this diode is used in a circuit where the forward current through it is about 100 mA , estimate the voltage across it? What would happen to the current if the temperature is increased?

