



- Explain the following terms
  - Heterojunction (5%)
  - Fixed Oxide charge (5%)
  - Schottky barrier potential of a metal/p-type junction (5%)
  - Threshold voltage (5%)
- For a pin junction, the charge distribution is shown in Fig.1. Draw the field and voltage distributions and find the applied voltage. (15%)  
 $(n_i=10^{10}/\text{cm}^3, kT=0.025\text{eV}, \ln 10=2.3)$

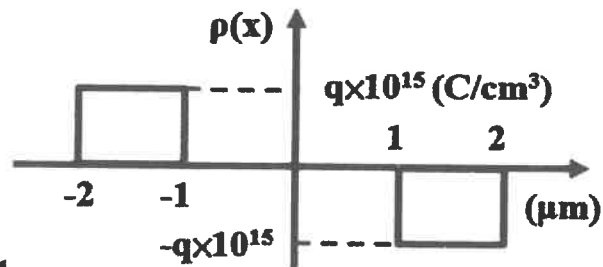


Fig.1

- Describe the reasons the dominate current is electron or hole current of (a)  $p^+n$  and (b)  $p^+N$  junctions, where + and N mean high doping concentration and wider band gap, respectively. (15%)
- Explain or define the following terms:
  - N-type dopants for Silicon (5%)
  - Depletion region of p-n junction (5%)
  - Hole carriers in a semiconductor (5%)
  - Electron mobility (5%)
- Describe the advantages of direct bandgap for semiconductors. (15%)
- Describe briefly the formation of the build-in potential in a p-n junction diode. (15%)