

### Homework 3

EE 362 Electronic, Magnetic, & Optical Properties of Materials (Spring 2026)

Friday, January 30, 2026

- 1) 3.5
- 2) 3.9a w/  $a = 4 \text{ \AA}$ .
- 3) 3.17
- 4) 3.18c Repeat part a) for Germanium.
- 5) 3.26c Repeat part a) for Germanium.
- 6) 3.27c Repeat part a) for Germanium.
- 7) 3.42a
- 8) A semiconductor has a Fermi energy of 0.4 eV. *a)* At 70°F, determine the energy  $E_a = E_F + 2.2k_B T$  (eV) and the probability that a state at  $E_a$  is occupied by an electron (unitless and %). *b)* At 70°F, determine the energy  $E_b = E_F - 2.5k_B T$  (eV) and the probability that a state at  $E_b$  is occupied by a hole (unitless and %).

**Due Wednesday, February 4, 2026.**

Notes:

- Carry *at least 8* significant figures on constants/parameters in calculations. Give answers with **5-6** significant figures.
- Consult Table B.4 in Appendix B for Germanium properties.