DEPARTMENT OF PHYSICS AND NANOTECHNOLOGY
SRM INSTITUTE OF SCIENCE AND TECHNOLOGY

Lecture-10

SOLVING PROBLEMS

2.

10 In intrinsic GaAs, the electron and hole mobilities are 0.85 and 0.04 $m^2 V^{-1}s^{-1}$ respectively and the effective masses of electron and hole respectively are 0.068 and 0.50 times the electron mass. The energy band gap is 1.43 eV. Determine the carrier density and conductivity at 300K.

Conductivity of a semiconductor is given by

$$\sigma = (n e \mu_e + p e \mu_p)$$

$$= n_i e (\mu_e + \mu_p)$$

$$= (2 \times 10^{12}) \times (1.6 \times 10^{-19}) [(0.85 + 0.04)]$$

$$= 2.85 \times 10^{-7} \text{ mho / m}$$