

Maulana Azad National Institute of Technology, Bhopal
Department of Physics

Assignment –3
(PHY-102) B. Tech. Semester - I

1. The current gain in CB mode of a NPN transistor is 0.98 and the collector base leakage current I_{CBO} is $12 \mu A$. Calculate: (1) The collector current I_C (2) The base current I_B for the emitter current $I_E = 2 \text{ mA}$.
2. In the common base mode a transistor, the emitter current is 1 mA . When the emitter circuit is open, the collector current is $50 \mu A$. If $\alpha = 0.92$, calculate the total collector current.
3. 1.0 ampere current flows in a silver strip of length 5 mm and width 0.1 mm , along its length. The strip is placed in a magnetic field of strength 1.0 tesla along its width. Calculate the Hall voltage developed across the width of the strip. (Atomic weight of Silver = 108 and density = $10.5 \times 10^3 \text{ Kg/m}^3$)
4. A current of $1 \mu A$ flows in copper strip of length 10 cm and width 0.1 cm along its length. The strip is placed in a magnetic field of strength $3 \times 10^{-6} \text{ Wb/m}^2$ perpendicular to its length. If Hall coefficient of copper is $0.55 \times 10^{10} \text{ volt meter}^3 \text{ per ampere weber}$, find the Hall voltage developed in it.
5. What is the difference between drift current and diffusion current?
6. What is the reverse saturation current in transistors? Explain I_{CBO} and I_{CEO} .
7. What do you understand by classically forbidden region? Explain α -decay and quantum harmonic oscillator in this context.
8. The wave function for the one dimensional motion of a particle is $\psi = Ax$ when $0 \leq x \leq 1$. Calculate (i) the value of A (ii) the probability of finding a particle in the range $x = 0$ to $x = 0.5$ (iii) the expectation value of x .
9. Calculate the energy required for an electron to jump from ground state to the second excited state in a potential well of width L .