

PREREQUISITE ASSESSMENT

Course: Semiconductor Technologies

Third-Year Electronic Engineering — Option: Industrial Computing

Instructions: Answer all the questions below to assess your foundational knowledge before starting the Semiconductor Technologies module.

PART 1: SHORT ANSWER QUESTIONS

- Q1. What is an electron, and what is its electric charge?
- Q2. What does the term "potential energy" mean in an electric field?
- Q3. What is a crystal, and how does it differ from an amorphous solid?
- Q4. What does Planck's constant (h) represent, and where is it used?
- Q5. What is the difference between conductors, insulators, and semiconductor materials?
- Q6. What is an electric field, and how is it calculated?

PART 2: SINGLE-CHOICE QUESTIONS (SINGLE SELECT)

QCU1. The elementary charge of an electron is equal to:

- a) $+1.6 \times 10^{-19} \text{ C}$
- b) $-1.6 \times 10^{-19} \text{ C}$
- c) $9.1 \times 10^{-31} \text{ C}$
- d) $6.63 \times 10^{-34} \text{ C}$

QCU2. The energy of a photon is given by:

- a) $E = mc^2$
- b) $E = h\nu$
- c) $E = qV$
- d) $E = \frac{1}{2}mv^2$

QCU3. In a perfect crystal, atoms are arranged:

- a) randomly
- b) periodically
- c) in amorphous layers
- d) without any organization

QCU4. The unit of the electric field is:

- a) Newton (N)
- b) Volt per meter (V/m)
- c) Joule (J)
- d) Coulomb (C)

PART 3: MULTIPLE-CHOICE QUESTIONS (MULTIPLE SELECT)

QCM1. The fundamental quantities in electricity are:

- a) Charge
- b) Current
- c) Voltage
- d) Mass

QCM2. Negatively charged particles are:

- a) Electrons
- b) Protons
- c) Negative ions
- d) Neutrons

QCM3. The kinetic energy of a particle is:

- a) $\frac{1}{2}mv^2$
- b) $h\nu$
- c) mc^2
- d) qV (if accelerated by a potential difference)

QCM4. Common crystalline solids include:

- a) Silicon
- b) Germanium
- c) Wood
- d) Glass (amorphous)

QCM5. Photons are characterized by:

- a) A frequency
- b) A wavelength
- c) A speed c
- d) A rest mass

QCM6. In a uniform electric field:

- a) The force exerted on a charge q is $F = qE$
- b) The field E is constant
- c) The potential varies linearly
- d) The field E depends on the velocity of the charge