

## PH2161 ENGINEERING PHYSICS IMPORTANT 2 MARKS AND 16 MARKS

### I UNIT-CONDUCTING MATERIALS

#### Part – A

Define mobility give its unit.

Define Drift velocity.

What are the drawbacks of classical free electron theory.

Define Mean free path.

Define Collision Time.

Define Electrical Conductivity.

Define Thermal Conductivity.

State Wiedemann-Franz law.

Define Lorentz number.

Define relaxation time of an electron.

What is Planck's Hypothesis?

State Planck's radiation – law.

Define Compton-effect.

Write Planck's radiation formula.

Write down Schrodinger time independent and time dependent wave equation with symbol.

Give the physical significance of wave function.

What are the eigen value and eigen function?

Write Fermi-Dirac distribution formula.

Define Fermi level and Fermi Energy with its importance.

How does Fermi function vary with temperature

what is work function.

What are bound and free electrons?

For Copper the relaxation time is  $10^{-14}$  seconds. The free electron density is

$2 \times 10^{28}/\text{m}^3$ . Calculate its electrical conductivity.

What is the probability of an electron being thermally promoted to the Conduction band in

silicon ( $E_g = 1.07 \text{ eV}$ ) at  $25^\circ\text{C}$ ?

Give the expression for change in wavelength of a scattered X-ray Photon.

#### Part-B

Derive the electrical conductivity of a metal based on classical free electron theory.

Derive the thermal conductivity of a metal based on classical free electron theory.

State and Prove Wiedemann-Franz law.

What is Compton Effect? Give the theory of Compton Effect and Show that the Compton shift

$$\Delta\lambda = \frac{h}{m_0c} (1 - \cos\theta)$$

Explain the application of Schrodinger wave equation to a one Dimensional Potential well.

Derive Time independent Schrodinger wave equation and hence deduce the time dependent

Schrodinger equation.

Describe the energy band theory of solids with the help of neat band diagram. Distinguish

between metals insulator and semiconductor on the basis of band theory.

Derive the expression for Planck's theory of Black body radiation.

### Unit- II SEMI CONDUCTORS MATERIALS

#### Part – A

# Ph2161 Engineering Physics

**Guillaume Favre**



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