

MALLA REDDYUNIVERSITY

(Telangana State Private Universities Act No.13 of 2020 and G.O.Ms.No.14, Higher Education (UE) Department)

Maisammaguda, Dhulapally, Hyderabad-500 100, Telangana

**Applied Physics Minor – II Question Bank**

**Unit – III**

1. State Heisenberg’s uncertainty principle and prove non-existence of electron in the nucleus.
2. Derive the Schrodinger time-independent wave equation for matter waves, write the physical significance of wave function.
3. Obtain the expression for energy levels and wave function of a particle enclosed in one-dimensional infinitely deep potential well.

**Unit – IV**

1. Illustrate the salient features of classical and quantum free electron theories and summarize their merits and demerits.
2. Define Fermi level and Fermi energy, discuss the variation of Fermi factor with energy and temperature.
3. Derive the density of states expression for electrons in a cubical metal piece.
4. Discuss the formation of allowed and forbidden energy bands in solids using Kronig–Penny model.
5. Derive an expression for the effective mass of an electron, and explain it’s variation with wave vector (k).
6. Explain the origin of energy bands in solids, classify the crystalline solids based on band theory of solids.

**Unit – V**

1. Derive an expression for the carrier concentration in an intrinsic semiconductor.
2. What is extrinsic semiconductor? Derive an expression for carrier concentration in p-type semiconductor.
3. What is extrinsic semiconductor? Derive an expression for carrier concentration in n-type semiconductor.
4. State Hall effect and derive the expression for Hall coefficient for an n-type semiconductor, and mention few applications of Hall effect.
5. Explain the formation of p-n junction and discuss V-I characteristics of p-n junction diode.
6. (a) What is LED? Explain the construction and working of LED.

(b) What is Photo diode? Explain the construction and working of photo diode.