I/IV B. Tech – Second Semester

**CE/ChE/CS/IT/EC/EE/ME -122**

**Engineering Physics - II**

Lectures : **3 Periods/Week** Internal Assessment : **40Marks**

Tutorials : **1 Period/Week** Semester End Examination : **60Marks**

Semester Exam: **3hrs** Credits : **3**

**Unit-I**  **(11 Periods)**

**Principles of Quantum Mechanics:** de Broglie’s concept of matter waves, Davisson and Germer experiment, Heisenberg’s uncertainty principle-experimental verification (electron diffraction - single slit), time independent Schrodinger’s wave equation, physical significance of the wave function, particle in a box (one dimensional).

**Electron Theory of metals:**  Failures of Classical free electron theory, quantum free electron

theory (qualitative).

**Band theory of Solids:** Bloch theorem (Qualitative), Kronig-Penney model (Qualitative treatment), effective mass of electron.

**Unit-II (10 Periods)**

**Semiconductor Physics:** Energy band formation in solids, Classification of solids into metals, semiconductors and insulators, intrinsic & extrinsic semiconductors, density of states, intrinsic semiconductor carrier concentration, Hall effect and its uses.

**Optoelectronic devices:**  Photo diode, LED,LCD and solar cell (qualitative treatment).

**Unit -III** **(10 Periods)**

**Magnetic Materials:** Introduction,orbital magnetic moment of an electron, Bohr magneton, classification of dia, para and ferro magnetic materials on the basis of magnetic moment, Hysteresis curve, soft and hard magnetic materials, Ferrites and their applications.

# Superconductivity: Introduction, critical parameters (Tc, Hc, Ic), Meissner effect, types of superconductors, entropy, specific heat, energy gap and isotope effect, BCS Theory(in brief), applications of superconductors, high Temperature superconductors(qualitative).

**Unit –IV**  **(11 Periods)**

**Dielectric Materials:** Fundamental definitions: Electric dipole moment, polarization vector, polarizability, electric displacement, dielectric constant and electric susceptibility. Types of polarizations - Electric and ionic polarizations, internal fields in solids(Lorentz method), Clausius-Mossotti equation, Frequency dependence of polarization, Ferroelectrics and their applications.

**Nano Technology** : Basic Concepts of Nanotechnology, nano scale, introduction to nano materials, surface to volume ratio, General properties of nano materials in brief, fabrication of nano materials (sol-gel and chemical vapour deposition methods), applications of nano materials, characterisation of nano materials by XRD, Transmission Electron Microscope(TEM).

**Text Books**

1. Applied Physics- P. K. Palanisamy, Scitech Publications.
2. Materials Science - M.Arumugam, Anuradha Publications, Chennai.

**Reference Books**

1. Materials science – M. Vijaya and G. Rangarajan, TMH, New Delhi

2. Solid state physics by A. J. Dekkar

3. Physics of atom – Wehr and Richards.

4. Engineering Physics – B. K. Pandey & S. Chaturvedi, Cengage Learning India Pvt. Ltd., Delhi.