**Applied Physics GR20**

**UNIT 1**

1. Distinguish between Photo electric effect and Compton effect.

2. Describe De-Broglie hypothesis in detail. Provide an experimental (Davison and Germer experiment) validity for De-Broglie hypothesis or Explain the experimental verification of matter waves by Davison and Germer experiment.

3. Derive an expression for Schrödinger’s time independent wave equation. Explain the physical significance of Wave function.

4. Obtain a solution for particle enclosed in one-dimensional potential box or Derive an expression for the energy states of a particle trapped in one-dimensional potential box.

5. Explain the following:

(i) Black body radiation (ii) Heisenberg’s uncertainty principle

**UNIT 2**

1. Derive an expression for carrier concentration of intrinsic semiconductors?

2. Derive an expression for carrier concentration in n-type extrinsic semiconductors?

3. Derive an expression for carrier concentration in p-type extrinsic semiconductors?

4. What is Hall Effect? Write an expression for Hall coefficient.

5. Describe the formation of p-n junction and discuss I – V characteristics of p – n junction diode in forward and reverse bias conditions.

6. Describe the construction, principle, working of NPN and PNP bipolar junction transistors.

7. Write a short note on (i) Intrinsic and extrinsic semiconductors (ii) drift and diffusion

(iii) Zener diode.

**UNIT 3**

1. Explain the construction, working and characteristics of LED.

2. Describe the principle, construction and working of Semiconductor laser with relevant energy level diagram?

3. Explain the structure and working principle of p-i-n photodiode.

4. Explain the structure and working principle of Avalanche photodiode.

5. Explain the structure, working principle and characteristics of solar cell.

6. Write a short note on (i) internal photoelectric effect (ii) applications of Lasers in various fields.

**UNIT 4**

1. Derive the relation between the probabilities of spontaneous emission and stimulated emission in terms of Einstein’s coefficients.

2. Explain the principle, construction and working of Ruby Laser with energy level diagram.

3. Explain the principle, construction and working of He-Ne Laser with energy level diagram.

4. Define and derive the expressions for acceptance angle and Numerical Aperture.

5. Distinguish i) Step index and Graded index fibers ii) Single mode and Multimode fibers.

6. Mention the advantages of optical fibers over the metallic cables.

7. Explain the optical fiber communication link with help of block diagram.

8. Write a short note on (i) population inversion (ii) resonator.

**UNIT 5**

1. Define polarization. Explain different types of polarizations in dielectrics.

2. Derive the expressions for electronic and ionic polarizations.

3. Explain the origin of magnetic moment.

4. Explain the classification of magnetic materials on the basis of magnetic moment.

5. Explain the hysteresis phenomenon based on domain theory of ferromagnetism.

6. Write a short note on (i) soft and hard magnetic materials (ii) Ferrites

7. Explain Type I and Type II super conductors.

8. Explain general properties superconductors.

9. Write a short note on (i) Meisner effect (ii) applications of superconductors