

**Subject Code: 2SC1050401**

**Subject Title: Physics 401**

**COURSE OBJECTIVE:**

Physics is a science to understand the nature. This course is designed to get basic understanding of the physical world.

**LEARNING OUTCOMES:**

- Develop an actual understanding of the crystal binding.
- To know the basic concept of quantum mechanics and optical instruments.
- Understand the behavior of plasma and polarization of light.

| Teaching scheme (hours) per week |           | credit |           | Theory Marks          |                  | Practical Marks       |                  | Total |
|----------------------------------|-----------|--------|-----------|-----------------------|------------------|-----------------------|------------------|-------|
| Theory                           | Practical | Theory | Practical | University Assessment | Cont. Assessment | University Assessment | Cont. Assessment |       |
| 3                                | --        | 3      | --        | 70                    | 30               | --                    | --               | 100   |

**A. Physics Theory:**

| Unit | Content                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | Lectures | Weight (%) |
|------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------|------------|
| 1    | <b>Atomic Cohesion and Crystal Binding:</b><br>Cohesion of Atoms, Primary Bonds, The Covalent Bond, The Metallic Bond, The Ionic Bond, Mixed Bond, Secondary Bonds, The Vander wall's Bond, The Hydrogen Bond, The Cohesive Energy, Ionic Crystal, Noble Gas Crystal, Atomic Radii vs Lattice constants, Elastic constants of crystals, Elastic Stress, Elastic Energy density, Application to Cubic crystal, Bulk modulus and compressibility.                                                                                                    | 15       | 33         |
| 2    | <b>Physical Interpretation and Condition on 'Ψ':</b><br>Conservation of Probability, Expectation values, Ehrenfest's Theorem, Admissibility Condition on the Wave function. Stationary States and Energy Spectra Stationary states: The time Independent Schrödinger Equation, A particle in a square well potential, Bound States in a square well ( $E > 0$ ), The square well: Non localized states ( $E > 0$ ).                                                                                                                                | 15       | 33         |
| 3    | <b>Polarization:</b><br>Introduction, Polarization by double refraction, Double refraction, Huygens' explanation of double refraction, Types of polarized light, Retarders or Wave plates, Quarter wave plate, Half wave plate, Production of Elliptically polarized light, Detection of Elliptically polarized light.<br><b>Resolving Power:</b><br>Resolving Power of Optical Instrument, Resolving Power of a telescope, Relation between magnifying power and resolving power of a telescope, Resolving Power of a Plane transmission grating. | 15       | 34         |

**Basic Reference book:**

1. Introduction to Solid State Physics by C.Kittel, Wiley Estarn. Delhi

2. Solid State Physics by Saxena, Pragati Prakasion.
3. Solid State Physics by C. M. Kachhawa
4. Quantum Mechanics by John L. Powell and Bernd Crasemann
5. Quantum Mechanics by Ghatak and Loknath
6. Quantum Mechanics by Schiff
7. Introduction to Plasma Physics and Controlled Fusion Vol.-1 by F.F.Chen.
8. Plasma Physics by S.N.Sen
9. A Text book of Light by D.N.Vasudeva - S. Chand &Co.