1.	Title of the course	Condensed Matter Physics
2.	Course number	PH505L
3.	Structure of credits	3-1-0-4
4.	Offered to	PG
5.	New course/modification to	Modification To PH5208/10
6.	To be offered by	Department of Physics
7.	To take effect from	July 2022
8.	Prerequisite	Nil
9.	**Course Objective(s):** To introduce the various fundamental concepts of condensed matter physics and materials science such as lattice vibrations, thermal properties, free electron and band theory of solids, quantum description of the magnetism, superconductivity and superfluidity.	
10.	**Course Content:** Crystal structure, Bragg and Laue diffraction, structure factor; Lattice vibration and thermal properties: Brillouin zone, phase and group velocities, density of states, acoustic and optical modes, phonons, Einstein and Debye models; Free electron theory: Fermi gas, specific heat, Ohm's law, thermal conductivity; Band theory: Bloch theorem, nearly free electron model, classification of metal, insulator and semiconductor, motion of electrons in energy bands, effective mass, band structure calculations, tight binding model, Fermi surfaces of metals, dielectrics, ferroelectrics and lattice defects; Quantum theory of magnetism and introduction to superconductivity, superfluidity.	
11.	**Textbook(s):** 1. Ashcroft N W and Mermin N D, *Solid State Physics*, Cengage (2003). 2. Kittel C, *Introduction to Solid State Physics*, Wiley (2012).	
12.	**Reference(s):** 1. Blundell S, *Magnetism in Condensed Matter*, Oxford (2001). 2. Buckel W, and Kleiner R, *Superconductivity: Fundamentals and Applications*, Wiley (2004). 3. Dekker A J, *Solid State Physics*, Laxmi Publications (2008).	