

STELLA MARIS COLLEGE (AUTONOMOUS), CHENNAI

Course Schedule: June - November 2023

Department : PHYSICS

Name/s of the faculty : CHRISTY PREETHA. A

Course Title : SOLID STATE PHYSICS

Course Code : 19PH/MC/SS54

Shift : I

Week & No. of hours	Units & Topics	Teaching Methodology	Text & References	Method of Evaluation
June 19 – June 26, 2023 (Day Order 1 to 6)	Introduction to Solid State physics Unit 1 Crystal Bonding 1.1 Bonding in solids- bond energy, bond length- types of bonding-Primary bonds	Lecture and problem solving	Solid State Physics by S O Pillai Solid State Physics by Ilangoan. K	Quiz
June 27 – July 04, 2023 (Day Order 1 to 6)	1.1 - Ionic bonding - Potential Energy Diagram of Ionic Molecule 1.2 Covalent Bond- properties of covalent solids - Metallic bond -properties of Metallic solids	Lecture and problem solving	Solid State Physics by S O Pillai Solid State Physics by Ilangoan. K	Questioning on the content taught
July 05– July 12, 2023 (Day Order 1 to 6)	1.3 Secondary bonds- Van der Waal's bond (molecular bond) – Van der Waal's Bond formation in Helium- properties of Van der Waal bonded solids- hydrogen bonding – hydrogen bond formation in water-properties of hydrogen bonded solids.	Lecture	Solid State Physics by S O Pillai Solid State Physics by Ilangoan. K	Questioning on the content taught
July 13 – July 20, 2023 (Day Order 1 to 6)	Unit 2 Defects 2.1 Classification of Imperfections- Electronic defects – Energy of formation of a vacancy-Equilibrium concentration of Schottky and Frenkel defects in an ionic crystal	Lecture and problem solving	Solid State Physics by Singhal, R.L.	Problem solving in groups
July 21 – July 28, 2023 (Day Order 1 to 6)	2.2 Line defects – Edge dislocation – Burger vector – Screw Dislocation	Lecture	Solid State Physics by Ilangoan. K	Questioning on the content taught
July 31 – Aug 03, 2023	Unit 3 Electrical properties of solids 3.1 Classical Free electron theory of metals - the free electron gas – Drude Lorentz free electron theory- Ohm's law – expressions	Lecture and problem solving	Solid State Physics by S O Pillai	Third Comp Test 1

(Day Order 1 to 4)	for electrical conductivity Thermal conductivity- Wiedemann Franz ratio			
Aug 04 – Aug 09, 2023	C.A. Test – I			
Aug 10 – Aug 11, 2023 (Day Order 5 to 6)	3.2 Hall effect - Hall voltage – Hall coefficient – mobility and Hall angle - Experimental determination of Hall coefficient	Lecture and problem solving	Solid State Physics by Ilangovan. K	Third Comp Test 1
Aug 14 – Aug 22, 2023 (Day Order 1 to 6)	Unit 4 Magnetic properties of solids 4.1 Different types of magnetic materials - Langevin’s theory of diamagnetism - Langevin’s theory of paramagnetism - Curie’s law-failure of Langevin’s theory	Lecture and problem solving	Solid State Physics by Ilangovan. K Fundamentals of Solid State Physics by Saxena, B.S., R.C. Gupta and P.C. Saxena	Third Comp Test 2
Aug 23 – Aug 31, 2023 (Day Order 1 to 6)	4.1 Weiss theory of paramagnetism-Curie-Weiss law. 4.2 Ferromagnetism-domain theory of ferromagnetism-Exchange energy-magnetic energy-anisotropic energy-Domain wall energy	Lecture	Solid State Physics by Ilangovan. K	Third Comp Test 2
Sept 01 – Sept 11, 2023 (Day Order 1 to 6)	4.2 Hysteresis loop of a ferro magnetic materials- explanation of hysteresis curve with domain theory 4.2 Antiferro and ferromagnetic materials – Applications of ferromagnets	Lecture	Solid State Physics by Singhal, R.L., Solid State Physics by Ilangovan. K	Assignment
Sept 12 – Sept 19, 2023 (Day Order 1 to 6)	Unit 5 Superconductors 5.1 Introduction- effect of magnetic field – magnetic properties of superconductors – perfect diamagnetism or the Meissner effect	Lecture	Introductory Solid State Physics by Charles Kittel Solid State Physics by Ilangovan. K	Quiz
Sept 20 - Sept 27, 2023 (Day Order 1 to 6)	5.1 Type I and type II superconductors- Isotope effect 5.2 Thermodynamic effects -entropy, specific heat, Thermal conductivity	Lecture	Solid State Physics – K. Ilangovan	Problem solving in groups

Sept 29 – Oct 03, 2023 (Day Order 1 to 3)	5.2 Energy gap- electrodynamics of superconductors- first and second London equations-drawbacks of London theory	Lecture	Solid State Physics – K. Ilangovan	Questioning on the content taught
Oct 04 – Oct 09, 2023	C.A. Test – II			
Oct 10 – Oct 12, 2023 (Day Order 4 to 6)	5.3 – Qualitative explanation of BCS theory of superconductivity	Lecture	Introductory Solid State Physics by Charles Kittel	Questioning on the content taught
Oct 13 – Oct 20, 2023 (Day Order 1 to 6)	5.3 Applications of superconductors	Power Point presentation	Introductory Solid State Physics by Charles Kittel Solid State Physics by Ilangovan. K	Third component 3 - Student Presentation
Oct 25 – Oct 27, 2023 (Day Order 1 to 3)	5.3 Applications of superconductors (contd)	Power Point presentation	Introductory Solid State Physics by Charles Kittel Solid State Physics by Ilangovan. K	Third component 3 - Student Presentation
Oct 28- Nov 04, 2023	REVISION			