

STELLA MARIS COLLEGE (AUTONOMOUS), CHENNAI

COURSE PLAN (June - November 2026)

Department : PHYSICS
Name/s of the Faculty : Dr. D. Anceila
Course Title : SOLID STATE PHYSICS
Course Code : 23PH/MC/SS54
Shift : I

COURSE OUTCOMES (COs)

COs	Description	CL
CO1	recall the definitions and concepts connected with crystal structure, interatomic bonding, electric and magnetic behaviour, and superconductivity.	K1
CO2	summarize regular crystal structures, how X-ray diffraction can be used to find structure of crystalline solids, bonding mechanisms using their structure, the impact of bonding and imperfections on the properties of solids, the conductivity of different types of solids based on their band gap, the theories governing the electrical and magnetic properties, the basics of Superconductors and the relevance of solid-state in present-day research.	K2
CO3	utilize the knowledge of crystal structure to understand the properties of solids, the essence of the electron theories to elucidate conduction of heat and current, the	K3

	magnetism theories to comprehend the origin of magnetism in matter, and the reason for superconducting property.						
CO4	do mathematical computations based on theoretical models to describe the properties of solids.						K4
CO5	develop skills in critical thinking, analytical reasoning and solving problems related to solid state physics.						K5
Week	Unit No.	Content	Cognitive Level	Teaching Hours	COs	Teaching Learning Methodology	Assessment Methods
Jun 15 – 22, 2026 (Day Order 1- 6)	1	Crystal Structure Crystalline and amorphous solids – Crystal lattice and translation vectors - Unit cell vs primitive cell – Basis	1-5	5	1-5	Lecture, PPT	Mini quiz
Jun 23 – July 1, 2026 (Day Order 1- 6)	1	Symmetry operations – Five-fold rotation symmetry -Point group and space group	1-5	5	1-5	Lecture, PPT, Group discussion	Model building of groups using digital tools
July 2 – July 8, 2026 (Day Order 1- 6)	1	Bravais lattices – Crystal	1-5	5	1-5	Lecture, PPT	Problem

		planes and Miller indices. Bragg's Law – Diffraction of crystals by X- rays.					Solving
July 9 – 16, 2026 (Day Order 1- 6)	2	Crystal Bonding and Crystal Defects Bonding in solids – Types of bonding - Primary and secondary bonds - Ionic bonding - Properties of ionic solids - Covalent bond – Properties of covalent solids -Metallic bond – Properties of metallic solids – Bond length and bond strength.	1-5	5	1-5	Lecture, PPT presentation, Problem Solving	Group Discussion
July 17 – 24, 2026 (Day Order 1- 6)	2	Classification of defects in solids – Types of point defects- Schottky and Frenkel defects - Equilibrium concentration of Schottky and Frenkel defects in Ionic crystals – Effects of crystal imperfections on the	1-5	5	1-5	Lecture, PPT, Demonstration	Component Test I Theory Test Unit 1 K1, K2, K3 assessment

		electrical, optical, and mechanical properties of solids. Classical free electron theory of metals – The Free electron gas					
July 25 – 28, 2026 (Day Order 1- 3)	3	Classical free electron theory of metals – The Free electron gas – Drude-Lorentz free electron theory – Ohm’s law –Expressions for electrical conductivity – Thermal conductivity - Wiedemann and Franz ratio.	1-5	5	1-5	Lecture, PPT, Demonstration, Problem solving	Short theory test
July 29 – Aug 3, 2026	C.A. Test - I						
Aug 4 - 6, 2026 (Day Order 4 - 6)	3	Band gaps – Metals, semiconductors, and insulators –Fermi level and Fermi surface – Intrinsic semiconductor – Extrinsic semiconductor - Hall effect – Experimental determination of Hall coefficient.	1-5	5	1-5	Lecture, PPT	Short quiz

Aug 7 – 14, 2026 (Day Order 1- 6)	4	Basic definitions Different types of magnetic materials – Langevin’s theory of paramagnetism - Curie’s law – Failure of Langevin’s Theory - Weiss theory of paramagnetism - Curie-Weiss law.	1-5	5	1-5	Lecture, PPT, Demonstration, Problem Solving	Short test
Aug 17 - 24, 2026 (Day Order 1- 6)	4	Domain theory of ferromagnetism - Origin of domains -Exchange energy - Magnetostatic energy – Anisotropic energy - Domain wall energy	1-5	5	1-5	Lecture, PPT, Problem Solving	Component Test 2 Problem Test- K 5 Assessment
Aug 25 – Sep 2, 2026 (Day Order 1- 6)	4	Hysteresis - Explanation of hysteresis with domain Theory - Antiferro and ferrimagnetic materials.	1-5	5	1-5	Lecture, PPT, Group Discussion	Think-pair-share
Sep 3 – 11, 2026 (Day Order 1- 6)	5	Introduction – Properties of superconductors: Critical temperature, critical field, isotope effect, Meissner effect –	1-5	5	1-5	Lecture, Demonstration, Problem Solving	Group discussion

