Lecture Plan

Name of the College: Government College of Arts, Science and Commerce. Sanquelim - Goa

Name of Faculty: Vidhita Parab	**Subject:** Physics	
Paper code: PYD107	**Program: T.Y.B.Sc**	**Division:**
Academic year: 2024-25	**Semester: V**	**Total Lectures: 45**

Course Objectives: To understand solid state physics and solve problems and apply concept to higher level theoretical physics

Course Outcome: 1. Define lattice translation vectors, basis, unit cell, determine miller indices and explain different crystal systems and bravais lattices
2. discuss free electron theory of metals and band theory of metals and extend this knowledge to understand different properties of solids.
3. classify solids on the basis of their band gap.
4. explain magnetic, dielectric and ferroelectric properties of materials.

Student Learning Outcome: A To understand Quantum mechanics and solve problems and apply concept to higher level conceptual physics

Month	Lecture From	Lecture To	No. of lectures allotted	Topic, Subtopic to be covered	Exercise/ Assignment	ICT Tools	Reference books
June- july	28-06-2024	06-07-2024	3	Amorphous Materials Crystalline Materials			1. Introduction to Solid State

				Lattice Translation Vectors			Physics, Charles Kittel, 8th Edition, 2004, Wiley India Pvt. Ltd. 2. Solid State Physics, S.O. Pillai, Mc-Graw Hill. 3. New Course in Physics, Gogawale & Lele, Vol. I. Sheth Publishers
	08-07-2024	13-07-2024		Basis			
				Unit Cell			
			3	Miller Indices, Reciprocal Lattice			
	15-07-2024	20-07-2024		Types of Lattices			
				Brillouin zones			
			3	Diffraction of X-rays by Crystals,			
	22-07-2024	27-07-2024		Bragg‟s Law			
				Drude‟s Free electron model			
			3	Fermi Dirac distribution			
August	29-07-2024	03-08-2024		thermionic emission			
				Contact potential			
			3	Electrons in periodic lattice			
	05-08-2024	10-08-2024		Kronig Penny Model (Qualitative Approach)			
				Effective mass of electron			
			3	Concept of hole			
	12-08-2024	17-08-2024	1	Classification of materials based on band structure			
	19-08-2024	24-08-2024		Effect of magnetic field on electrons,			
				Hall effect			
			3	Diamagnetic, Paramagnetic			

	26-08-2024	31-08-2024		Ferrimagnetic and Ferromagnetic Materials			1. Introduction to Solid State Physics, Charles Kittel, 8th Edition, 2004, Wiley India Pvt. Ltd. 2. Solid State Physics, S.O. Pillai, Mc-Graw Hill. 3. New Course in Physics, Gogawale & Lele, Vol. I. Sheth Publishers
				Classical Langevin Theory of diamagnetic			
				Classical Langevin Theory of Paramagnetic Domains			
	02-09-2024	05-09-2024	3	Quantum Mechanical Treatment of Paramagnetism. Curie‟s law Discussion of B-H Curve. Hysteresis and Energy Loss.			
September							
				, Weiss‟s Theory of Ferromagnetism			
			2				
	13-09-2024	14-09-2024		Ferromagnetic Domains.			
			1				
	16-09-2024	21-09-2024		Discussion of B-H Curve.			
				Hysteresis and Energy Loss.			
			3	polarization.			
	23-09-2024	28-09-2024		Local Electric Field at an atom			
				Depolarization Field. Electric Susceptibility.			
				Polarizability. Clausius Mosotti Equation			
			3				
	30-09-2024	05-10-2024		Classical Theory of Electric Polarizability. Langevin- Debye equation.			
October			3				

				Complex Dielectric Constant. Optical Phenomena		
				Application: Plasma Oscillations, Plasma Frequency, Plasmons, Tranverse optic modes		
	07-10-2024	12-10-2024		Structural phase transition		
				Classification of crystals		
			3	Piezoelectric effect, Pyroelectric effect,		
	14-10-2024	22-10-2024		Ferroelectric effect		
				Electrostrictive effect, Curie-Weiss Law		
			3	Ferroelectric domains, PE hysteresis loop		

1. Introduction to Solid State Physics, Charles Kittel, 8th Edition, 2004, Wiley India Pvt. Ltd.
2. Solid State Physics, S.O. Pillai, Mc-Graw Hill.
3. New Course in Physics, Gogawale & Lele, Vol. I. Sheth Publishers

Assessment Rubrics

Component	Max Marks
ISA 1	7.5
ISA 2	7.5
Practical	
Project	
Semester End Exam	60