Course Code: PHY-526 Number of Credits: 4(1+3P) Title of the Course: Methods of Experimental Physics Effective from AY: 2022-23 NII Course Objectives: NiI Course Objectives: This course seeks to develop understanding of principles of measurement of various fundamental quantities in a Physics laboratory. 1 hours + Content: 1. Measurement of temperature Thermocouple, diode and semiconductor sensors, RTD, pyrometer, Langmuir probes, 1 hours + 2. Measurement of resistance Two probe measurement and four probe measurement using constant current source and constant voltage source, Lock-in amp, discharge of capacitance 1 hours + 3. Measurement of radiation GM counter, ionization chambers, scintillation detector, solid state detectors, CCD detectors 1 hours + 5. Measurement of fraquency RC circuit, DC bridges, AC Bridges 1 hours + 5. Measurement of magnetic flux Force methods, induction methods (including SQUID), Hall probe, indirect methods (MOKE) 1 hours + 6. Measurement of frequency Resonance methods 9 hours 7. Estimation of errors in measurement. Precision and accuracy, estimation of errors, propagation of errors, general formula, least square fitting, non-linear least square 9 hours	Programme: M. Sc. (Phy	/sics)		
Number of Credits: 4(1L+3P) Effective from AY: 2022-23 Prerequisites for the course: Nil Course Objectives: This course seeks to develop understanding of principles of measurement of various fundamental quantities in a Physics laboratory. Content: 1. Measurement of temperature 1 hours + Thermocouple, diode and semiconductor sensors, RTD, pyrometer, Langmuir probes, 1 hours + Zonstant voltage source, Lock-in amp, discharge of capacitance 1 hours + Sonstant voltage source, Lock-in amp, discharge of capacitance 1 hours + Measurement of radiation 15 hours GM counter, ionization chambers, scintillation 1 hours + Measurement of magnetic flux 15 hours RC circuit, DC bridges, AC Bridges 1 hours + Measurement of magnetic flux 15 hours GM counter, ionization chambers, scintillation detector, solid state detectors, CCD detectors 1 hours + Measurement of frequency 15 hours Force methods, induction methods (including SQUID), Hall probe, indirect methods (MOKE) 1 hours + Measurement of rerors in measurement. Precision and accuracy, estimation of errors, propagation of errors, general formula, least square fitting, non-linear least square	Course Code: PHY-526		Title of the Course: Methods of Experimental Physic	S
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Prerequisites for the course: Nil Image: Nil Course Objectives: This course seeks to develop understanding of principles of measurement of various fundamental quantities in a Physics laboratory. 1 Content: 1. Measurement of temperature Thermocouple, diode and semiconductor sensors, RTD, pyrometer, Langmuir probes, 1 hours + 2. Measurement of resistance Two probe measurement and four probe capacitance 1 hours + 3. Measurement of capacitance constant voltage source, Lock-in amp, discharge of capacitance 1 hours + 4. Measurement of radiation detector, solid state detectors, CCD detectors 1 hours + 5. Measurement of magnetic flux Force methods, induction methods (including SQUID), Hall probe, indirect methods (MOKE) 1 hours + 6. Measurement of frequency Resonance methods 1 hours + 1 hours + 7. Estimation of errors in measurement. Precision and accuracy, estimation of errors, propagation of errors, general formula, least square fitting, non-linear least square 9 hours	Effective from AY: 2022	-23		
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6. Measurement of frequency 15 hours Resonance methods 9 hours 7. Estimation of errors in measurement. Precision and accuracy, estimation of errors, propagation of errors, general formula, least square fitting, non-linear least square Image: square			SQUID), Hall probe, indirect methods (MOKE)	1 hours +
Resonance methods 9 hours 7. Estimation of errors in measurement. 9 hours Precision and accuracy, estimation of errors, 9 hours propagation of errors, general formula, least square 9 hours fitting, non-linear least square 9 hours		6.	Measurement of frequency	15 hours
7. Estimation of errors in measurement. Precision and accuracy, estimation of errors, propagation of errors, general formula, least square fitting, non-linear least square Pedagogy:			Resonance methods	9 hours
Precision and accuracy, estimation of errors, propagation of errors, general formula, least square fitting, non-linear least square		7.	Estimation of errors in measurement.	
propagation of errors, general formula, least square fitting, non-linear least square			Precision and accuracy, estimation of errors,	
fitting, non-linear least square			propagation of errors, general formula, least square	
Pedagogy: Lectures and Laboratory Experiments			fitting, non-linear least square	
Ececures and Educatory Experiments.	Pedagogy:	Lectu	res and Laboratory Experiments.	
References/Readings 1. P. R. Beyington and D. K. Robinson, Data Reduction	References/Readings	1.	P. R. Bevington and D. K. Robinson, Data Reduction	
and Error Analysis for the Physical Sciences,	<u> </u>		and Error Analysis for the Physical Sciences,	
McGraw Hill (Indian Edition) 2015.			McGraw Hill (Indian Edition) 2015.	
2. R. Srinivasan, K. R. Priolkar and T. G. Ramesh, A		2.	R. Srinivasan, K. R. Priolkar and T. G. Ramesh, A	
Manual on Experiments in Physics, Indian Academy			Manual on Experiments in Physics, Indian Academy	
of Sciences, 2018.			of Sciences, 2018.	
Course Outcomes: Student will be able to	<u>Course Outcomes:</u>	Student will be able to		
1. Understand the advantages and disadvantages of		1.	Understand the advantages and disadvantages of	
using a technique or probe for making scientific			using a technique or probe for making scientific	
measurements.		ъ	measurements.	

	measuring devices.				
	3. Estimate and translate errors and report quantities				
	up to last significant digit				
	4. Construct scientific apparatus for measurement of				
	physical quantities.				
Programme: M. Sc. (Ph	ysics) (Solid State Physics)	<u> </u>			
Course Code: PHS-601 Title of the Course: Solid State Physics I					
Number of Credits: 4					
Effective from AY: 2023	3-24				
Prerequisites for the	Should have basic knowledge of Quantum Mechanics and				
course:	Statistical Mechanics				
Course Objectives:	1. To introduce fundamental concepts of solids like				
	crystalline order, symmetry in solids, simple crystal	l			
	structures and their properties.	l			
	2. To acquaint with the concept of reciprocal lattice and	ļ			
	its importance in structure determination using x-rays.	ļ			
	3. To introduce different types of crystal bindings and	ļ			
	elastic properties of solids.	l			
	4. To familiarize the concept of lattice vibration and their	l			
	role in thermal and optical properties of solids.				
Content:	Crystal Structure	20 hours			
	Crystals - Lattice, Bravais lattice, primitive unit cell,	l			
	symmetry of molecules and crystals, symmetry operations	l			
	and symmetry elements, Lattices in one, two and three	ļ			
	dimensions, Space groups, definitions of directions,	ļ			
	coordinates and planes.	l			
	Simple crystal structures: NaCl, CsCl, diamond, hexagonal	l			
	close-packed structure, cubic ZnS structure and their	ļ			
	properties, Non ideal crystal structures – random stacking	l			
	and polytypism	l			
	Reciprocal Lattice - Diffraction of waves by crystals, Bragg	l			
	law, Scattered wave amplitude - Fourier analysis, reciprocal	l			
	lattice vectors, diffraction conditions, Laue equations,	l			
	Brillouin zones, Geometric structure factor, Atomic	l			
	Structure factor	13 hours			
	Point Defects General Thermodynamic Features, Color	ļ			
	centres, Line Defects: Dislocations	l			
	Crystal Binding and Elastic Constants	l			
	Crystals of Inert gases - Van der Waals - London Interaction,	l			
	repuisive interaction, equilibrium lattice constants,	l			
	conesive energy, ionic Crystals - Electrostatic or Madelung	l			
	Energy, evaluation of iviadelung constant, covalent crystals,	1E bours			
	Analysis of electic strains, electic compliance and stiffered	T2 HORLS			
	Analysis of elastic strains, elastic compliance and stiffness	l l			
	Thermal Properties	l l			
	Vibrations of a one dimensional monatomic lattice first				
	Prillouin zono group volocity long wavelength limit	l l			
	bimouni zone, group velocity, iong wavelength limit,				