

GDC Memorial College, Bahal (Bhiwani)

NAAC Accredited Grade "B"

Lesson Plan- Jan to April 2025

Name - Dr. Jyoti Kumari

Department - Physics

Class - M.Sc. Physics

Subject - Quantum Mechanics II

Semester - 2nd

Subject Code - 22PHY-201

Week-1

UNIT-I

20-Jan-25	Stationary Perturbation Theory- Introduction
21-Jan-25	Non-Degenerate Case:- 1st & 2nd Order Correction to Energy Eigen Values & Eigen Functions
22-Jan-25	Perturbation of Harmonic Oscillator
23-Jan-25	Perturbation of an Harmonic Oscillator
24-Jan-25	Ground State of Helium Atom

Week-2

27-Jan-25	Removal of Gdegeneracy of 2nd Order
28-Jan-25	First Order Stark Effect in $n=2$ state of Hydrogen
30-Jan-25	Rayleigh-Ritz Vibrational Method

Week-3

3-Feb-25	Ground and Excited States
4-Feb-25	Application to ground state of Helium
6-Feb-25	Doubts
7-Feb-25	Doubts

Week-4

UNIT-II

10-Feb-25	The WKB Approximation:- General Formalism
11-Feb-25	First Order Time Dependent Perturbation Theory
12-Feb-25	Transition Probability for constant and Harmonic Perturbation
14-Feb-25	Transition to a Group of Final States

Week-5

17-Feb-25	The Fermi Golden Rule
18-Feb-25	Interaction of an Atom with Electromagnetic Radiations
19-Feb-25	Transition Probability for Induced Absorption and Emission

20-Feb-25	Electric Dipole Transition and Selection Rules
21-Feb-25	Magnetic Dipole Transitions
Week-6	
24-Feb-25	Forbidden Transitions
25-Feb-25	Higher Order Transitions
28-Feb-25	Doubts
Week-7	UNIT-III
3-Mar-25	Scattering Experiments and Cross Sections
4-Mar-25	Laboratory and Center of Mass System
5-Mar-25	Scattering Amplitude and Cross Sections
6-Mar-25	Method of partial Waves- Phase Shift
7-Mar-25	Differential and Total Cross-Sections
Week-8	
10-Mar-25	Relation b/w Phase Shift and Scattering Potential
11-Mar-25	Convergence of Partial waves Series
12-Mar-25	Scattering by a Finite Square Well
Week-9	
17-Mar-25	Scattering by a Hard Sphere Potential
18-Mar-25	Born Series
19-Mar-25	First Born Approximation
20-Mar-25	Scattering of an Electron by a Screened Coulomb Potential in Born Approximation
21-Mar-25	Scattering of Two Identical Spinless Bosons and spin- 1/2 Fermions
Week-10	UNIT-IV
24-Mar-25	Many Particle Schrodinger Wave Equations
25-Mar-25	Identical Particles
26-Mar-25	Physical Meaning of Identity
27-Mar-25	Principle of Indistinguishability and its Consequences
28-Mar-25	Do
Week-11	
31-Mar-25	Exchange Operator
1-Apr-25	Symmetric Wave Functions

2-Apr-25	Anti-symmetric Wave Function
3-Apr-25	Do
4-Apr-25	Symmetry and Statistics
Week-12	
7-Apr-25	Fermions and Bosons
8-Apr-25	Spin and Total Wave Functions for a System of two spin 1/2 particles
9-Apr-25	Do
10-Apr-25	Pauli Exclusion Principles
11-Apr-25	Do
Week-13	
14-Apr-25	Application to the Electronic system of the Helium Atom
15-Apr-25	Do
16-Apr-25	Connection b/w spin
17-Apr-25	Slater Determinant
18-Apr-25	Do
Week-14	
21-Apr-25	Doubts
22-Apr-25	Revision
23-Apr-25	Test
24-Apr-25	Revision
25-Apr-25	Test
Week-15	
28-Apr-25	Doubts
29-Apr-25	Doubts
30-Apr-25	Doubts

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Lesson Plan- Jan to April 2025

Name - Dr. Jyoti Kumari

Department - Physics

Class - M.Sc. Physics

Subject - Experimental Techniques

Semester - 4th

Subject Code - 22PHY-403C

Week-1

UNIT-I

1-Jan-25 Experimental Tech. to observe the defect in lattice : Introduction

2-Jan-25 TEM

3-Jan-25 XRD

Week-2

6-Jan-25 experimental Tech. to observing dislocation and stacking faults : Introduction

7-Jan-25 Optical Tech.

8-Jan-25 Photoluminescence

9-Jan-25 FTIR

10-Jan-25 Raman Spectroscopy Tech.

Week-3

UNIT-II

15-Jan-25 Surface Analytical Techniques:- Introduction

16-Jan-25 Auger electron Spectroscopy AES

17-Jan-25 XPS (ESCA)

Week-4

20-Jan-25 Do

21-Jan-25 Do

22-Jan-25 UV- Photoemission

23-Jan-25 X-RAY Absorption Techniques

24-Jan-25 SIMS

Week-5

27-Jan-25 Rutherford Back Scattering

28-Jan-25 Do

30-Jan-25 Do

Week-6	
3-Feb-25	Test
4-Feb-25	Doubt class
6-Feb-25	Low Energy Electron Diffraction Techniques
7-Feb-25	Do
Week-7	UNIT-III
10-Feb-25	Opto Electronic Devices :- Introduction
11-Feb-25	Solar Cells
12-Feb-25	Photo Diodes
14-Feb-25	Photo - Detectors
Week-8	
17-Feb-25	Introduction to LEDs
18-Feb-25	Data Interpretation & Analysis
19-Feb-25	Do
20-Feb-25	Precision and Accuracy
21-Feb-25	Error Analysis
Week-9	
24-Feb-25	Propagation of Errors
25-Feb-25	Least Square Fitting
28-Feb-25	Linear & Non Linear Curve Fitting
Week-10	
3-Mar-25	Chi- Square Test
4-Mar-25	Introduction to Modulation Techniques
5-Mar-25	Amplitude Modulation
6-Mar-25	Frequency Modulation
7-Mar-25	Doubt class
Week-11	
10-Mar-25	Test
11-Mar-25	Doubt Session
12-Mar-25	Do
Week-12	

17-Mar-25	Introduction to Scanning Probe Techniques
18-Mar-25	Do
19-Mar-25	Do
20-Mar-25	Detailed Study of Spectroscopic Techniques
21-Mar-25	Doubts
Week-13	
24-Mar-25	Test
25-Mar-25	Test Discussion
26-Mar-25	Electron Spin Resonance
27-Mar-25	Do
28-Mar-25	Doubts
Week-14	
31-Mar-25	Doubts
1-Apr-25	Nuclear Magnetic Resonance
2-Apr-25	Do
3-Apr-25	Do
4-Apr-25	Doubts
Week-15	
7-Apr-25	Test
8-Apr-25	Scanning Probe Techniques
9-Apr-25	Scanning Tunneling Microscopy
10-Apr-25	Atomic Force Microscopy
11-Apr-25	Scanning Tunneling Spectroscopy
Week-16	
14-Apr-25	Revision
15-Apr-25	Revision
16-Apr-25	Revision
17-Apr-25	Revision
18-Apr-25	Revision

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Lesson Plan- Jan to April 2025

Name - Dr. Jyoti Kumari

Department - Physics

Class - M.Sc. Physics

Subject - Statistical Mechanics

Semester - 4th

Subject Code - 22PHY-401

Week-1

UNIT-I

1-Jan-25 Introduction to Macroscopic and Microscopic State

2-Jan-25 Postulates of equal Prio Probability

3-Jan-25 Contact b/w Statistics and Thermodynamics

Week-2

6-Jan-25 Gibb's Paradox

7-Jan-25 Sackur Tetrode Equation

8-Jan-25 Ensemble Theory:- Concept of Ensemble

9-Jan-25 Phase Space

10-Jan-25 Density Function

Week-3

15-Jan-25 Ensemble Average

16-Jan-25 Liouville's Theorem

17-Jan-25 Stationary Ensemble

Week-4

20-Jan-25 Thermodynamics of a System of Non Interacting Classical Harmonic Oscillator

21-Jan-25 Application of Classical Ideal Gas

22-Jan-25 magnetic System Using canonical Ensemble

23-Jan-25 Calculation of Statical Quantities

24-Jan-25 Doubt Class

Week-5

UNIT-II

27-Jan-25 Grand Canonical Ensemble and Grand Canonical Partition Function

28-Jan-25 Thermodynamics of a System of a Classical Ideal Gas using Grand Canonical Ensemble

30-Jan-25 Energy and Density Fluctuation

Week-6	
3-Feb-25	Quantum Mechanical Ensemble Theory
4-Feb-25	Equation of Motion of Density Matrix
6-Feb-25	Quantum Mechanical Ensemble Average
7-Feb-25	Statistics of Indistinguishable Particles
Week-7	
10-Feb-25	Fermi-Dirac Statistics
11-Feb-25	Bose- Einstein Statistics
12-Feb-25	F-D & B-E Distribution Function Using Micro Canonical & Grand Canonical Ensembles
14-Feb-25	Statistics of occupation Numbers
Week-8	
17-Feb-25	Ideal Bose Gas- Internal Energy Equation of state
18-Feb-25	Bose- Einstein Condensation in Ultra-Cold atomic gases
19-Feb-25	Do
20-Feb-25	Black Body radiations
21-Feb-25	Liquid Helium
Week-9	UNIT-III
24-Feb-25	Ideal Fermi Gas: Internal Energy, Equation of state
25-Feb-25	Fermi Gas
28-Feb-25	Electron Gas in Metals
Week-10	
3-Mar-25	Thermionic Emission
4-Mar-25	Cluster Expansion Method for a Classical Gas- Simple Cluster Integrals
5-Mar-25	Mayer- Ursell Relations
6-Mar-25	Virial Expansion of equation of the State
7-Mar-25	Van Der Waal's Equation
Week-11	
10-Mar-25	Validity of Cluster Expansion Method
11-Mar-25	Doubt Class
12-Mar-25	Test
Week-12	UNIT-IV

17-Mar-25	Phase Transition
18-Mar-25	Ising model
19-Mar-25	Solution of Ising Model in the Bragg's William Approximation
20-Mar-25	Critical Exponents
21-Mar-25	Landau Theory of Phase Transition
Week-13	
24-Mar-25	Scaling Hypothesis
25-Mar-25	One and Two Dimensional Ising Model
26-Mar-25	Thermodynamic Fluctuations and Probability Distribution Law
27-Mar-25	Do
28-Mar-25	Doubts
Week-14	
31-Mar-25	Doubts
1-Apr-25	Doubts
2-Apr-25	Doubts
3-Apr-25	Doubts
4-Apr-25	Doubts
Week-15	
7-Apr-25	Test
8-Apr-25	Spatial Correlation in a Fluid
9-Apr-25	Connection density fluctuations
10-Apr-25	Spatial Correlation
11-Apr-25	Brownian Motion
Week-16	
14-Apr-25	Revision
15-Apr-25	Revision
16-Apr-25	Revision
17-Apr-25	Revision
18-Apr-25	Revision