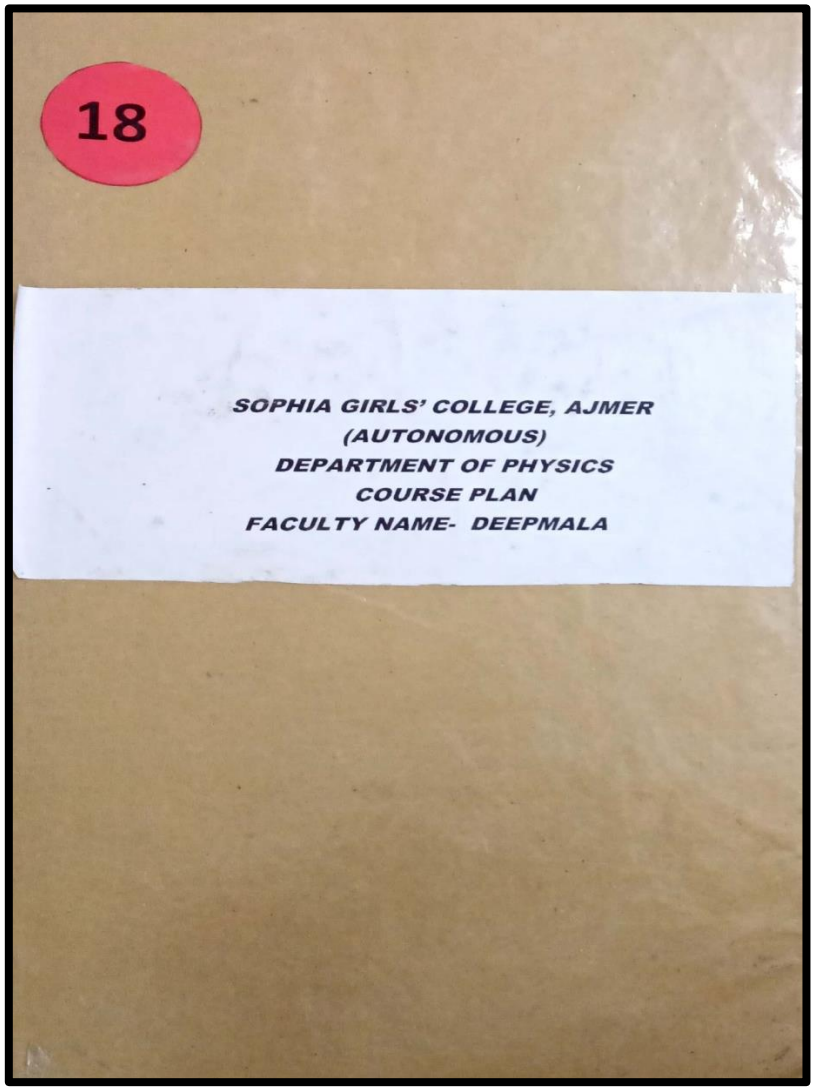
SOPHIA GIRLS' COLLEGE(AUTONOMOUS), AJMER



COURSE_PLAN_2019-20_MRS_DEEPMALA_SINGHAL

COURSE PLAN (PHYSICS)

U.G Programs

2019-2020

SOPHIA GIRL'S COLLEGE, AJMER (*AUTONOMOUS*)

B.Sc. I (SEMESTER I)

Mechanics (PAPER I) (PHY 101)

Max. Marks : 75 (50Ext; 25 Int) Min. Marks: 30(20 Ext;10 Int) Credit: 03

COURSE PLAN 2019-2020

SEM I Month	UNIT/TOPIC	Concepts/facts	Teaching Pedagogy	Learning Outcomes	Questions	Marks Weightage (%)
JULY	Kinematics of moving fluids, Equation of continuity, Bernoulli's theorem and its applications – atomizer Torricelli's theorem and ventruimeter. Viscous fluids, Stream line and Turbulent flow, Poiseuille's law, Capillary tube flow Reynold's number, Stokes law, terminal velocity, Surface tension and surface energy, molecular interpretation of surface tension. Surface Energy, Excess pressure inside soap bubble, liquid drop and air bubble.	Viscosity. Bernoullie's theorem Bernoullie's theorem applications .	Giving different examples by relating with nature, white board teaching, students-teacher discussion ,PPT only for Theoretical concept	Calculation of Excess pressure and also meniscus of different liquids. Knowledge about the liquid flow	*Knowledge Based* -What is Viscosity? - Define Elastic collision. *Understanding Based* -Compare types of Flow of liquid. -Describe law of Conservation of momentum. *Higher Order Thinking Skills Based* -Derive expression of centre of mass	Knowledge--60 Understanding-30 Higher Order-10

February	Waves in media: Speed of transverse waves on a uniform string, Speed of longitudinal waves in a fluid, Energy density and energy transmission in Waves, Typical measurement, Group velocity and phase velocity, their measurements, superposition of waves.Standing waves: Standing waves as normal modes of bounded systems	Meaning of wave and its equation Production and detection of ultrasonic and infrasonic waves and applications	Class test,assignements,project work, class teaching on board,ppt	•Explain superposition of waves and their application in standing waves.	- Explain properties of standing waves –Give detail of Human ear.	
	Harmonics and quality of sound: examples. Production and detection of ultrasonic and infrasonic waves and applications					
March-April	Noise and Music: The human ear and its responses, limits of human audibility, intensity and loudness, bel and decibel, the musical scale, temperament and musical instruments. Plane electromagnetic waves in vacuum, Wave equation for E and B of linearly, circularly and elliptically polarised electromagnetic waves.	Wave equation for E and B of linearly, circularly and elliptically polarised.	Basic conceptsby examples..Theortical concept by PPt,White board teaching for derivation, Examples,group disscussion	•Relate Noise and Music, its scale and circularly elliptically polarized light		

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SOPHIA GIRL'S COLLEGE, AJMER (*AUTONOMOUS*)

B.Sc II (SEMESTER III) Thermodynamics and Statistical Physics (302)

Max. Marks : 75 (50Ext; 25 Int) Min. Marks: 30(20 Ext;10 Int) Credit: 03

COURSE PLAN

SEM I Month	UNIT/TOPIC	Concepts/facts	Teaching Pedagogy	Learning Outcomes	Questions	Marks Weightage (%)
JULY	Thermodynamics: Zeroth law of thermodynamics. First law of thermodynamics and its limitations.Second law of thermodynamics and its significance, Heat engine, Carnot's Heat engine and its efficiency. Joule	Basics knowledge of thermodynamics and working of Carnot's Heat engine	White board teaching for derivation,PPT, Examples,group disscussion	Explain the laws of Thermodynamics and thermodynamical functions.	*Knowledge Based* -What is I law of thermodynamics - Define Heat engine. *Understanding Based* -Compare I & II law of Thermodynamics. -Describe Helmholtz Functions. *Higher Order Thinking Skills Based* -Derive expression of Joule –THomosons effect -Derive Maxwells equations	Knowledge--40 Understanding-40 Higher Order-20
	Thomson effect, Joule-Thomson (Porous plug) experiment, conclusions and explanation, analytical treatment of Joule Thomson effect		Quiz, PPT,Practicles			
	Entropy.Thermodynamical functions: Internal energy (U), Helmholtz function (F), Enthalpy (H), Gibbs function (G) and the relations between them					
AUGUST	derivation of Maxwell thermodynamical relations from thermodynamical functions.	Detail concept of probability and its relation with entrophy	Diagrams, Class test,Examples, Numericals	Compose Probablity Problems and		

	Unit – II Microscopic and Macroscopic systems, events-mutually exclusive, dependent and independent.			relation between probability and entropy
	Probability, A- priori Probability Tossing any number of Coins, distributions of N (for N= 2,3,4) distinguishable and indistinguishable particles in two boxes of equal size, Micro and Macro states,			
SEPTEMBER-	Probability (Boltzmann's relation). Phase space, Division of Phase space into cells.			•Compare different types of statistics and their applications.
	Unit – III Need for Quantum Statistics: three kinds of statistics,	Comparison of : three kinds of statistics, Planck's radiations law.		
OCTOBER - November	basic approach in three statistics Bose-Einstein energy distribution law, Application of B.E. statistics to Planck's radiation law B.E. gas. Fermi – Dirac energy distribution law, F.D. gas and Degeneracy, Fermi energy and Fermi temperature.		Theortical concept by PPt,White board teaching for derivation, Examples,group discussion ,Class test	

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SOPHIA GIRL'S COLLEGE, AJMER (*AUTONOMOUS*)

B.Sc III (SEMESTER V) Quantum Mechanics (502)

Max. Marks : 75 (50Ext; 25 Int) Min. Marks: 30(20 Ext;10 Int) Credit: 03

COURSE PLAN

SEM I Month	UNIT/TOPIC	Concepts/facts	Teaching Pedagogy	Learning Outcomes	Questions	Marks Weightage (%)
JULY	**UNIT-1** Origin of Quantum theory: Failure of classical Physics to explain the phenomenon such as black body spectrum, Planck's radiation law. Compton effect, De-Broglie hypothesis,	Outcome of Quantum theory and Uncertainty principle and its consequences	White board teaching for derivation,PPT, Examples,group disscussion	•Understand Fundamental of Quantum theory, Heisenberg Uncertainty principle and its applications.	*Knowledge Based* -What is , De-Broglie hypothesis. -Define a wave function. *Understanding Based* -Write application of uncertainty principle -Compare time dependent and time independent Schrodinger equations. *Higher Order Thinking Skills Based* - For rectangular potential barrier, calculatef reflection and transmission coefficient. - Deduce Planck's	Knowledge--30 Understanding-50 Higher Order-20
	Uncertainty principle and its consequences gamma ray microscope, diffraction at a single slit.		Quiz, PPT,Practicles			
	. Application of uncertainty principle- (i) Non existence of electron in nucleus (harmonic oscillator. Energy-time uncertainty.					
AUGUST	ii) Ground state energy of H-atom (iii) Ground state energy of harmonic oscillator. Energy-time uncertainty. **UNIT-II** Fundamental postulates of quantum mechanics, eigen function and	Schrodinger equation – time dependent and time independent form and its physical significance.	Diagrams, Class test,Examples, Numericals	-Describe Wave Function and types of Schrodinger equation.		

	eigen value, degeneracy degeneracy orthogonality of eigen functions, commutation relations				radiation law equation.
	Schrodinger equation – time dependent and time independent form				
SEPTEMBER-	Physical significance of the wave function and its interpretation, probability current density			Solve various problems related to the boundary condition based on Schrodinger equation	
	operators in quantum mechanics.Expectation values of dynamical variables, the position, momentum and energy.				
OCTOBER - November	**UNIT-3** Simple Solutions of Schrodinger equation : Time independent Schrodinger equation and stationary state solution, Boundary and continuity conditions on the wave function, particle in one dimensional box , eigen function and eigen values , discrete energy levels extension of results for three dimensional case and degeneracy of levels. Potential step and rectangular potential barrier, calculation of reflection and transmission coefficient, Simple harmonic oscillator (one dimensional) eigen function, energy eigen values, zero point energy.	Application of schrodinger wave equation to solve different problems.	Theortical concept by PPt,White board teaching for derivation, Examples,group disscussion ,Class test		

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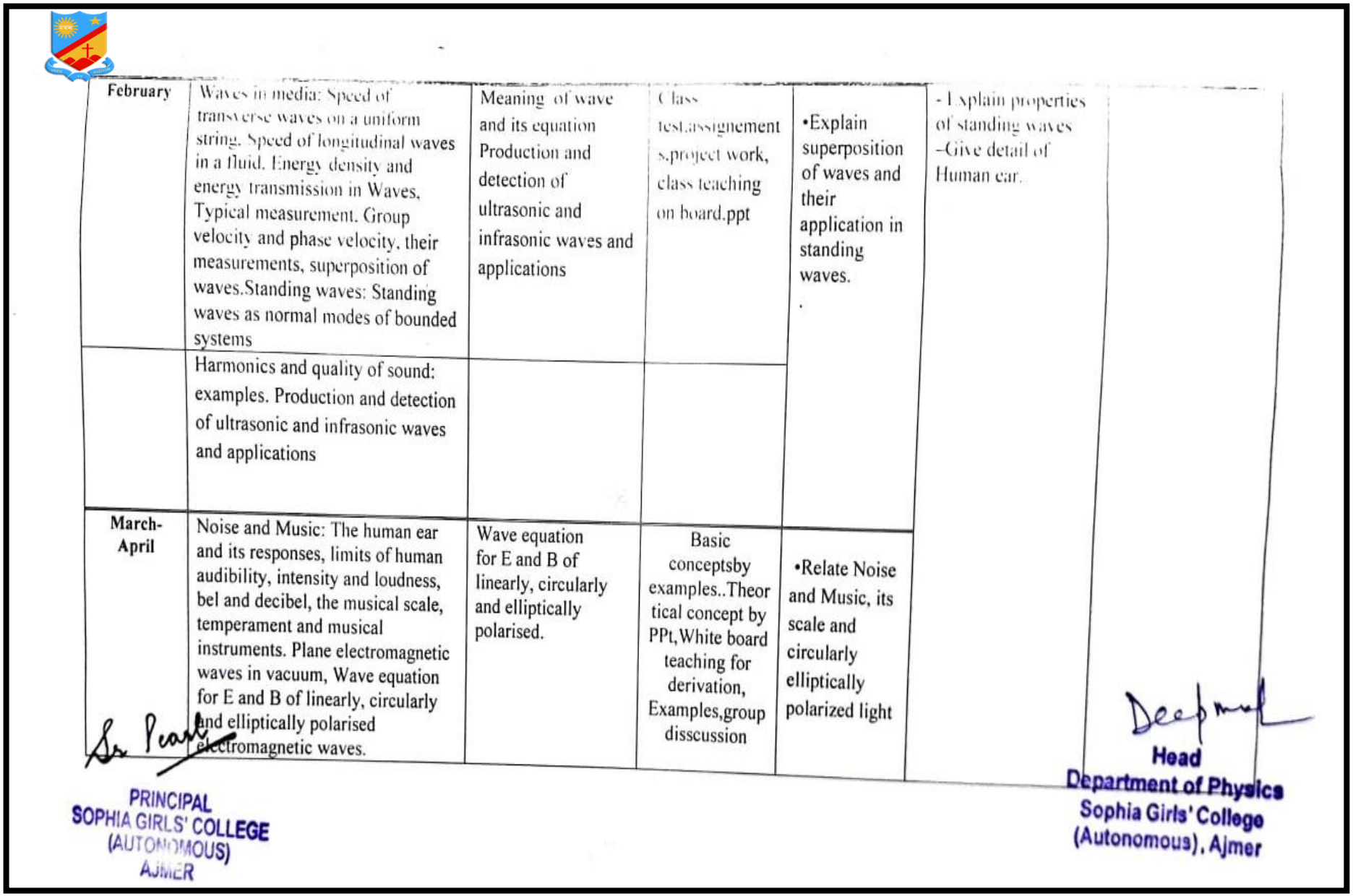
B.Sc I (SEMESTER II) Waves and Oscillations (202)

Max. Marks : 75 (50Ext; 25 Int) Min. Marks: 30(20 Ext;10 Int) Credit: 03

COURSE PLANS EM I Month	UNIT/TOPIC	Concepts/facts	Teaching Pedagogy	Learning Outcomes	Questions	Marks Weightage (%)
December-January	Potential well and periodic oscillations, cases of harmonic oscillations, differential equations and its solutions, Kinetic and Potential energy, Simple harmonic oscillations in-Spring and mass system	What is simple harmonic oscillator and time period of different oscillator	White board teaching for derivation,PPT, Examples,group discussion	•Calculate time period of various oscillators	*Knowledge Based* -WHAT IS S.H.M.? DefineLC circuit- What is Superposition principle? *Understanding Based* -Calculate time period of Torsional pendulum -Compare standing and Transverse wave *Higher Order Thinking Skills Based*	Knowledge--50 Understanding--40 Higher Order-10
	Simple and compound pendulum, Torsional pendulum, Bifilar oscillations, Helmholtz resonator, LC circuits, Vibration of magnet, Oscillation of two masses connected by a spring.		Discussion,Tutorial classes,Class teaching			



February	Waves in media: Speed of transverse waves on a uniform string. Speed of longitudinal waves in a fluid. Energy density and energy transmission in Waves. Typical measurement. Group velocity and phase velocity, their measurements, superposition of waves.Standing waves: Standing waves as normal modes of bounded systems	Meaning of wave and its equation Production and detection of ultrasonic and infrasonic waves and applications	Class test,assignements,project work, class teaching on board,ppt	•Explain superposition of waves and their application in standing waves. .	- Explain properties of standing waves –Give detail of Human ear.
	Harmonics and quality of sound: examples. Production and detection of ultrasonic and infrasonic waves and applications				
March-April	Noise and Music: The human ear and its responses, limits of human audibility, intensity and loudness, bel and decibel, the musical scale, temperament and musical instruments. Plane electromagnetic waves in vacuum, Wave equation for E and B of linearly, circularly and elliptically polarised electromagnetic waves.	Wave equation for E and B of linearly, circularly and elliptically polarised.	Basic conceptsby examples..Theor tical concept by PPt,White board teaching for derivation, Examples,group disscussion	•Relate Noise and Music, its scale and circularly elliptically polarized light	

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B.Sc II (SEMESTER IV) Optics (402)

Max. Marks : 75 (50Ext; 25 Int) Min. Marks: 30(20 Ext;10 Int) Credit: 03

COURSE PLAN

SEM I Month	UNIT/TOPIC	Concepts/facts	Teaching Pedagogy	Learning Outcomes	Questions	Marks Weightage (%)
December-January	Interference of a light: The principle of superposition, two slit interference, coherence requirements of the sources.Newton's ring and its application to find wavelength of light and refractive index of medium. Haidinger fringes : Fringes of equal inclination.	Fundamental knowledge of Interference,Newton rings and applications of Michelson interferometer	White board teaching for derivation,PPT, Examples,group disscussion	Summarize Interference and its application in Michelson interferometer	*Knowledge Based* -Define Interference -What is Superposition principle? *Understanding Based* -Write application of Michelson interferometer -Compare uniaxial and biaxial crystals. *Higher Order Thinking Skills Based* - Explain Working ofMichelson	Knowledge--30 Understanding-50 Higher Order-20
	Michelson interferometer it's application for precision determination of wavelength, Wavelength difference and the width of spectral lines.		Quiz, PPT,			

February	Polarization of light : Meaning of polarization, polarization by reflection: Brewster law, polarization by refraction through "Pile of plates", Laws ofMalus, Phenomenon of double refraction, uniaxial and biaxial crystals, Huygenstheory of double refraction, the ordinary and extra ordinary refractive indices.	What is the meaning polarisation and how it can be produced?.	Class test,assignements,project work, class teaching on board,ppt	• Explain Polarization phenomenon and Polaroids.	interferometer - Illustrate diffraction due to Nslits.	
	Production and Analysis of Polarized Light : production of plane polarizedlight, the Polaroid, Nicol prism, analyser and polarizer, double image prisms,quarter and half wave plates.					
March-April	Fresnel diffraction : Half periods zones,Fraunhofferdiffraction : Single slit, double slit, n slit, Intensity distribution, Plane diffraction grating, Dispersive power of a grating, Resolving power, Reyleigh criterion, resolving power : telescope, grating, prism.		Basic concepts of diffraction by pracical.Theortical concept by PPt,White board teaching for derivation, Examples,group disscussion	•Compare Fresnel and Fraunhoffer Diffraction and their application in grating.		

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B.Sc III (SEMESTER VI) Atomic and Molecular Spectroscopy (602)

Max. Marks : 75 (50Ext; 25 Int) Min. Marks: 30(20 Ext;10 Int) Credit: 03

COURSE PLAN

SEM I Month	UNIT/TOPIC	Concepts/facts	Teaching Pedagogy	Learning Outcomes	Questions	Marks Weightage (%)
December-January	Lasers and Holography : Spontaneous and stimulated emission, density of states, Einstein's A and B coefficients, Ratio of stimulated to spontaneous transitions in a system in thermal equilibrium	Fundamental knowledge of LASER and Types of LASER and Holography	Working of laser through energy level diagram White board teaching for derivation,PPT, Examples,group disscussion	• Describe properties of LASER, types of LASER and Holography applications.	*Knowledge Based* -Define population Inversion. -What is a rigid rotator? *Understanding Based* -Write application of Lasers -Compare Spontaneous and stimulated emission? *Higher Order Thinking Skills Based* - Explain Working of Ruby laser . -Illustrate Rotational energy levels of diatomic molecule	Knowledge--30 Understanding-50 Higher Order-20
	, Energy density of radiation as a result of stimulated emission and absorption, Condition for amplification, Population inversion, Methods of optical pumping		Quiz, PPT,Practicles			
	Energy level schemes of He-Ne and Ruby lasers, working of a laser source					
February	Special features of a laser source and their origin. Basic concepts of	Quantum features of one electronand spin-	Class			

	holography, construction of a hologram and reconstruction of the image. Unit – II Elementary Spectroscopy : Quantum features of one electron	orbit coupling.	test,assignements,project work, class teaching on board,ppt	•Explain continous and descrete enery levels of one electron atomp		
	spectral lines of hydrogen atom, Frank-Hertz experiment and discrete energy states, Stern and Gerlach experiment, Spin and Magnetic moment, Spin Orbit coupling and qualitative explanation of fine structure.					
March-April	Atoms in a magnetic field, Zeeman effect (normal and anomalous), Zeeman splitting. Unit – III Qualitative features of molecular spectroscopy, Rigid rotator, discussion of energy eigen values and eigen functions, Rotational energy levels of diatomic	Detail of Zeeman's splitting and rigid body rotator.	Theortical concept by PPt,White board teaching for derivation, Examples,group disscussion	•Summarise Molecular Spectra and Raman effect		

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