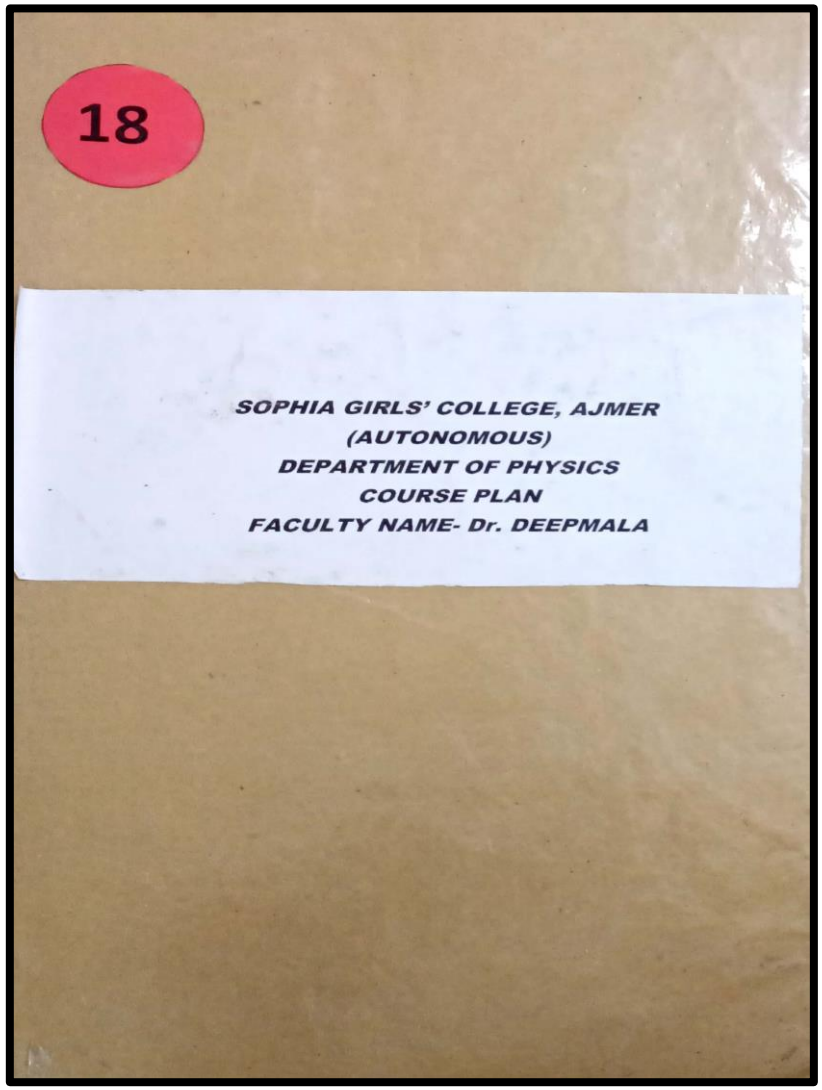
SOPHIA GIRLS' COLLEGE(AUTONOMOUS), AJMER



COURSE_PLAN_2020-21_DR_DEEPMALA_SINGHAL

COURSE PLAN (PHYSICS)

U.G Programs

2020-21

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 2018-19

SEM I Month	UNIT/TOPIC	Concepts/facts	Teaching Pedagogy	Learning Outcomes	Questions	Marks Weightage (%)
AUGUST-SEPTEMBER	**UNIT I** Kinematics of moving fluids, Equation of continuity, Bernoulli's theorem and its applications – atomizer Reynold's number, Stokes law, terminal velocity, Surface Energy, Excess pressure inside soap bubble, liquid drop and air bubble. Surface tension and surface energy, molecular interpretation of surface tension. Torricelli's theorem and ventruimeter. Viscous fluids, Stream line and Turbulent flow, Poiseuille's law, Capillary tube flow	Viscosity. Bernoullie's theorem Bernoullie's theorem applications .	Video Lecture, e-Content Giving different examples by relating with nature, 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 Terminal velocity? - Define Pressure	Knowledge--60 Understanding-30 Higher Order-10

OCTOBER-NOVEMBER	**UNIT II** System of particles, centre of mass, centre of mass of two particles and N particles systems , energy and momentum conservation, concepts of elastic and inelastic collisions. , motion of centre of mass, concept of reduced mass .	Meaning of angular momentum,Idea of centre of mass. Application of reduced mass and calculation of reduced mass of different system	Lecture on meet,Projects and assignments,PPT, Discussion on Numericals,Seminars.	Calculate centre of mass of two particles system,Conservation of angular momentum.	*Understanding Based* -Write types of Flow of liquid. -Derive Torricell's theorem.	
	.Angular momentum of a system of particles, Conservation of angular momentum, angular momentum about an arbitrary point.		Class test, Problem solving session, Remedial classes			
	Equation of motion of a rotating body, kinetic energy of rotation and idea of principles axes, Rigid body motion.	Fundamental knowledge of collision Momentum and detail study of principles axes.	Diagrams, Examples,Numericals,PPT			

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-			examples relating with nature, white board teaching, Experimental Discussion ,PPT only for Theoretical concept			
DECEMBER	**UNIT III** Elasticity, Small deformations, Young's modulus, Bulk modulus and Modulus of rigidity for an isotropic solid, Poisson ratio, relation between elastic constants. Theory of bending of beams and Cantilever, Torsion of a cylinder, Bending moments and Shearing forces. PCR Machine	Properties of solids, elastic constants. Theory of bending of beams	Experimental Knowledge,PPT only for Theoretical concept,Open book test,Tutorial classes	Knowledge about various rigidity of solids and calculation of bending moment.	*Higher Order Thinking Skills Based* -Define Collision.Derive the expression for elastic and inelastic collision. -Find an expression for Torsion constant.	

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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 Thomson effect,	Basics knowledge of thermodynamics and working of Carnot's Heat engine	Lecture on meet,teaching by solving derivation,PPT, Examples,group discussion,Seminars,	Explain the laws of Thermodynamics and thermodynamical functions.	*Knowledge Based* -What is II law of thermodynamics - Define an engine. *Understanding Based* -Compare I & II law of Thermodynamics. -What are the Helmholtz Functions.	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			
AUGUST	Entropy.Thermodynamical functions: Internal energy (U), Helmholtz function (F), Enthalpy (H), Gibbs function (G) and the relations between them					
	derivation of Maxwell thermodynamical relations from thermodynamical functions.	Detail concept of probability and its relation with	Diagrams, Class test,Examples,	Compose Probablity		

	Unit – II Microscopic and Macroscopic systems, events-mutually exclusive, dependent and independent.	entrophy	Numericals	Problems and relation between probability and entropy	*Higher Order Thinking Skills Based* -What is porous plug experiment?Derive expression of Joule – THomosons effect -Derive Maxwells equations	
SEPTEMBER	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,					
OCTOBER –	Probability (Boltzmann's relation). Phase space, Division of Phase space into cells.			•Compare different types of statistics and their applications.		
November	Unit – III Need for Quantum Statistics: three kinds of statistics, basic approach in three statistics basic approach in three statistics	Comparison of : three kinds of statistics, Planck's radiations law.				
	.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.		Lecture on meet,teaching by solving derivation,PPT, Examples,group discussion,Seminars,Group discussion			

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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	Lecture on meet,teaching by solving derivation,PPT, Examples,group discussion	•Understand Fundamental of Quantum theory, Heisenberg Uncertainty principle and its applications.	*Knowledge Based* -What i a photon? -Define a wave function. *Understanding Based* -What is uncertainty principle -Compare time dependent and time independent Schrodinger equations. *Higher Order Thinking Skills Based* - For rectangular potential barrier, calculatef reflection and transmission coefficient. - Explain photo-	Knowledge--30 Understanding-50 Higher Order-20
	Uncertainty principle and its consequences gamma ray microscope, diffraction at a single slit.		Quiz, PPT,Practicles			
AUGUST	. Application of uncertainty principle- (i) Non existence of electron in nucleus (harmonic oscillator. Energy-time uncertainty.					
	ii) Ground state energy of H-atom (iii) Ground state energy of harmonic oscillator. Energy-time uncertainty. **UNIT-II**	Schrodinger equation – time dependent and time independent form and its physical significance.	Diagrams, Class test,Examples, Numericals	-Describe Wave Function and types of		

	Fundamental postulates of quantum mechanics, eigen function and			Schrodinger equation.	electric effect	
	eigen value, degeneracy degeneracy orthogonality of eigen functions, commutation relations					
	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	Application of schrodinger wave equation to solve different problems.	Lecture on meet,teaching by solving derivation,PPT, Examples,group discussion,			

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	harmonic oscillator (one dimensional) eigen function, energy eigen values, zero point energy.					

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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 (%)
January-February	Unit-1 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	Lecture on meet,teaching by solving derivation,PPT, Examples,group discussion,Seminars,Group discussion	• To Calculate time period of various oscillators	*Knowledge Based* -Define simple harmonic motion.? DefineLC circuit- What isInterference? *Understanding Based* -Calculate time period of Torsional pendulum -Compare standing and Transverse wave *Higher Order*	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		Discussion,Tutorial classes,Class teaching			

	connected by a spring.				*Thinking Skills Based* - Derive an expression for maxima and minima in case of of standing waves –Give detail of Human ear.	
March-April	Unit-2 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 meet,ppt	•Explain superposition of waves and their application in standing waves. .		
May	Harmonics and quality of sound: examples. Production and detection of ultrasonic and infrasonic waves and applications					
July21	Unit-3 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,Meet classes 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) — ELECTRONICS - II (PHY-402)

Max. Marks: 75 (50 External; 25 Internal) | Min. Marks: 30 (20 External; 10 Internal) | Credit: 03

COURSE PLAN

SEM I Month	UNIT/TOPIC	Concepts/facts	Teaching Pedagogy	Learning Outcomes	Questions	Marks Weightage (%)
SEM I DECEMBER	UNIT I Logic circuits: Transistor as a Switch, logic fundamentals, AND, OR, NOT, NOR, NAND, XOR Gate. Boolean algebra.	Oscillators	Lecture on meet,teaching by solving derivation,PPT, Examples,group discussion,	Summarise Oscillators and its types.	*Knowledge Based* -What is Oscillator? -What is the condition for self-sustained oscillation?	Knowledge--60 Understanding-30 Higher Order-10
JANUARY	De Morgan's theorem, positive and negative logic, logic gates circuits realization using DTL and TTL Logic, Simplification of Boolean algebra. Working of Sauetizer Machine	Hartley Oscillator.				
FEBURARY	UNIT II Oscillators, Principle of Oscillation, classification of oscillators, condition for self-sustained oscillation: Barkhausen criterion for oscillation,	Transistor as a Switch.	Group Discussion, Lecture method, Quiz.	Explain	*Understanding Based* -Disciss AND, OR ,	

				Magnetic field and analysis of AC circuits	NOT Gates. -Discuss De-Morgan's theorem.	
FEBURARY	Tuned collector common emitter oscillator, Hartley oscillator, R-C oscillator and its advantages.	DTL and TTL logic.	Demonstration through examples, PPT, Quiz.			
MARCH	UNIT III Circuit analysis: Networks and some important definitions, loop and nodal equations based on DC and AC circuits (Kirchhoff's Laws).	Netwoks.	Lecture Method, PPT, quiz, numerical solving method.	. Classify Electrostatic properties of conducts and various boundary conditions.	***Higher Order Thinking Skills Based*** - Estimate Kirchhoff law.	
	Four terminal networks: current voltage conventions open, close and hybrid parameters of any four terminal network, input, output , and mutual independence for an active four terminal network. Various circuits theorems: Superposition, Thevenin, Norton, reciprocity, maximum power transfer and Miller Theorems.	Various circuit theorems.	Lecture Method, PPT, quiz, numerical solving method		- Expain hybrid parameters of any four terminal network.	

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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 (%)
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	Lecture on meet,teaching by solving derivation,PPT, Examples,group discussion,	• Describe properties of LASER, types of LASER and Holography applications.	*Knowledge Based* -Define LASER. -What is a rigid rotator? *Understanding Based* -Write application of Lasers -Compare Spontaneous and stimulated emission? *Higher Order Thinking Skills Based* - Explain Working of He-Ne LASER	Knowledge--30 Understanding-50 Higher Order-20
February	, 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					

	Special features of a laser source and their origin. Basic concepts of holography, construction of a hologram and reconstruction of the image. Unit – II Elementary Spectroscopy : Quantum features of one electron	Quantum features of one electronand spin-orbit coupling.	Class test,assignements,project work, class teaching on board,ppt	•Explain continous and descrete enery levels of one electron atomp	-Illustrate Rotational energy levels of diatomic molecule	
March-April	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.					
May-July	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.	Lecture on meet,teaching by solving derivation,PPT, Examples,group discussion,	•Summarise Molecular Spectra and Raman effect		

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