Amrut Sevabhavi Sanstha, Parbhani**.**
Late Ku. Durga K. Banmeru Science College,Lonar Dist-Buldhana.
Department of Physics
Teaching Plan Session:- 2022-23
Name :- Mr. Sharique S. Shaikh   Class:**-**B.Sc. I Year /Sem. I   Subject:- Physics
Paper:-1S- Mechanics, Properties of matters, Oscillations & Relativity **(CBCS)**

Sr. No.	Month	Name of Unit	Topics	Required Lect.	Total Lect.
1	Aug.	Unit I Rotational Dynamics	Rigid body, Torque, Rotation about fixed axis, Kinetic Energy of rotation, moment of inertia and its physical significance, Radius of gyration, Perpendicular and parallel axes theorem (Statement Only), Fly-wheel, Moment of inertia of different bodies (Rod, Disc, cylinder and sphere) about different axes, Rolling motion. Principle of Conservation of Angular momentum. Principle and working of Gyroscope. Numerical.	01 01 02 01 01 01 01 02 01 01	12
2	Aug.	Unit II SHM and its solution	, time period of simple pendulum, compound pendulum, kater's pendulum & Torsional pendulum; Bifilar pendulum (Qualitative). Damped Oscillations: Differential equation of damped harmonic oscillator and its solution, Energy equation of damped oscillations, Power dissipation and Quality factor. Forced Oscillations: Differential equation of forced oscillation (Qualitative), Resonance (Amplitude). Numericals	01 01 01 01 02 02 02 02	12
3	Sept.	Unit III Superposition of S.H.Ms.:	Superposition of two SHM of same frequency along the same line, superposition of two mutually perpendicular SHM of same frequency, Lissajous figures. Velocity of longitudinal waves (Newton's formula), Laplace correction, velocity of transverse waves in stretched string, Standing waves, Organ Pipe, harmonics and overtones. Velocity of waves by Kundt's tube. Ultrasonic waves: Production (piezoelectric crystal and Magnetostriction) and detection of ultrasonic waves and its applications in	01 02 01 01 01 01 01 01 01 01	12

			medical and industrial field. Numerical	01	
4	Sept.	Unit IV Elasticity:	Different types of elasticity, Twisting couple on a cylindrical rod or wire, Determination of modulus of rigidity by Maxwell needle, Torsional pendulum, Torsional oscillations, Modulus of rigidity of a material of wire by torsional pendulum, Beam, Bending of beam, Bending moment, External and internal bending moments, Cantilever, Expression for depression of a beam (i) loaded at one end and (ii) loaded at the center. Numerical	01 02 02 01 02 02 02 01	12
5	Oct.	Unit V Gravitation and Special Theory of Relativity	Kepler's laws of planetary motion (Statements only), Newton's law of gravitation, Variation of "g" with altitude and depth, weightlessness, Satellite in circular orbit and applications, Geosynchronous orbit, basic idea of Global Positioning System(GPS). Frame of reference, Inertial and Non-inertial frame of reference, Galilean transformation, Postulates of special theory of relativity, Lorentz transformation, length contraction, Time dilation, Einstein's mass energy relation. Numerical	01 02 01 01 01 02 01 02 01 01	12
6	Oct. /Nov.	Unit :- VI Skill Enhancement Module (SEM) Basics of Measurement Technique	Measurements: Significance of measurements, methods of measurements, Static and dynamic characteristics: Instruments accuracy, precision, sensitivity, resolution range etc. Errors in measurements: Types of errors: i) Gross errors ii) Systematic errors iii) Random errors and loading effects. Statistical evaluation of measurement data: Arithmetic mean & median, Average deviation: Measurement with Screw Gauge, Vernier Caliper, Travelling Microscope, Spectrometer.	01 01 01 01 01 01 01 01 01 01	12

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Amrut Sevabhavi Sanstha, Parbhani**.**
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Department of Physics
Teaching Plan Session:- 2022-23
Name :- Mr. Sharique S. Shaikh   Class:**-**B.Sc. I Year /Sem. II
Paper:- 2S Electrostatics, Magnetostatics, Ultrasonic Waves and Acoustics, Network Theorems **(CBCS)**

Sr. No.	Month	Name of Unit	Topics	Req. Lect.	Total Lect.
1	Jan	Unit I Vector Analysis:	Scalar and Vector product,	02	12
			gradient, divergence,	01	
			Curl and their significance,	02	
			Vector Integration, Line,	01	
			surface and volume integrals of Vector fields,	02	
			Gauss-divergence theorem	01	
			and Stoke's theorem of vectors.	02	
			Numerical	01	
2	Jan	Unit II Electrostatics:	Electrostatic Field,	01	12
			electric flux,		
			Gauss's theorem of electrostatics.	01	
			Applications of Gauss theorem- Electric field due to point charge, infinite line of charge,	01	
			uniformly charged spherical shell and solid sphere.	01	
			Electric potential as line integral of electric field,	01	
			potential due to a point charge, electric dipole,	01	
			uniformly charged spherical shell and solid sphere.	01	
			Relation between electric field and electric potential. Numerical	01	
3	Feb.	Unit III Capacitors:	Capacitance of an isolated spherical conductor.	02	12
			Parallel plate, spherical and cylindrical condenser.	01	
			Energy per unit volume in electrostatic field.	01	
			Dielectric medium,	01	
			Polarisation,	01	
			Displacement vector.	01	
			Gauss's theorem in dielectrics.	02	
			Parallel plate capacitor completely filled with dielectric.	01	
			Numerical	01	
4	Feb. /Mar.	Unit IV Magnetostatics:	Biot-Savart's law & its applications- straight conductor, circular coil, solenoid carrying current. Divergence and curl of magnetic field. Magnetic vector potential. Ampere's circuital law. Electromagnetic Induction:	01	12
				01	
				01	
			Faraday's laws of electromagnetic induction, Lenz's law, self and mutual inductance, L of single coil, M of two	01	
				01	

			coils. Energy stored in magnetic field. Numerical	01	
5	Mar.	Unit V Network Theorems	: Series circuit, Series voltage dividers, Parallel circuits, Series Parallel circuits, Resistances in series and parallel, Kirchhoff's Current and Voltage laws, Wheatstone's Bridge, Ideal constant voltage source, Ideal constant current source, Superposition theorem, Thevenin's theorem, Norton's theorem, Maximum power transfer theorem, Milliman's theorem, Numerical	01 01 01 01 01 01 01 01 01 02 01	12
6	Apr.	Unit VI Skill Enhancement Module (SEM) Multimeter	Principles of measurement of dc voltage and dc current, ac voltage, ac current and resistance. Specifications of a multimeter and their significance. Introduction to electrical components: Resistor-Types of Resistors, Color coding - Applications of a Resistor as a heating element in heaters and as a fuse element. Capacitor- Types of Capacitor, Color coding, Applications of Capacitor in power supplies, motors (Fans) etc. Inductor-Types of Inductors, EMF induced in an Inductor, Applications of Inductor in a fan, radio tuning 6 circuit and Series resonance circuit. Energy audit: Unit of electricity, power of domestic appliances.	02 02 02 02 02 02	12

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Late Ku. Durga K. Banmeru Science College, Lonar Dist-Buldhana.
Department of Physics
Teaching Plan Session:- 2022-23
Name :- Mr. Sharique S. Shaikh & Mr. Pavan Kolhe Class:**-**B.Sc. IInd Year /Sem. III
Subject:- Physics
Paper:- (3S) Solid state, Relativity & Geophysics

Sr. No.	Month	Name of Unit	Topics	Required Lect.	Total Lect.
1	July/Aug.	Unit-I Mathematical background and Electrostatics	*Gradient, divergence & curl of a vector field , Physical significance	03	13
			* Line surface & volume integral	02	
			* Gauss's divergence theorem	02	
			* Stoke's theorem	01	
			* work done on charge in electrostatic field	01	
			* Flux of a electric field	01	
			*Lorentz force equation (B)	01	
			* Ampere force law	01	
			* Ampere force law and its application	01	
2	July/Aug.	Unit:-II Magneto statics and Maxwell's equation	* Faraday's law	01	12
			* Integral and Differential form	02	
			*Displacement current and Maxwell's equation	02	
			* Wave equation satisfy by E and B	02	
			*Plane electromagnetic wave in vacuum	02	
			* Poynting vector and Theorem	02	
				01	
3	Aug./Sep	Unit- III Solid state Electronics Devices I	* Introduction to Semiconductors	01	12
			* Charge carrier and electrical conduction ; Doping	02	
			* Extrinsic semiconductors	01	
			* Fermi level and Energy level dia.	01	
			* Drift current in semiconductor	01	
			* Conductivity , Mobility	01	
			* Hall effect	01	
			* Hall coefficient	01	
			*Semiconductor Diode and it's biasing	01	
			* LED	01	
			* Varactor diode	01	
4	. Aug./Sep	Unit:-IV Solis state Electronics Devices II	* Working of BJT	01	13
			* Current gain $\acute{\alpha}$, β and their relation	01	
				01	
			* Chara. in CB , CE modes	01	
			*JFET construction and working	01	
			* Chara. Of FET	01	
			*Basic concept of Difference Amplifier	01	
			* IC-OP AMP	01	
			*Electrical parameter of OP-Amp	01	
			* Inverting and non- Inverting modes	01	
				01	
			* OP-AMP as Adder	01	
			* OP-AMP as Subtract or	01	

			* OP-AMP as Differentiator * OP-AMP as Integrator		
5	Sep./Oct	Unit:-V Special Theory of Relativity	* Postulates for the special theory of relativity	01	
			* Lorentz Transformations	01	
			* Time Dilation	01	
			* Velocity Addition Theorem	02	10
			* Length contraction,	01	
			* Relativity of mass	02	
			* Mass energy relation	01	
			* Numerical	01	
6	Sep./Oct	Unit :- VI Atmosphere and Geophysics	*Structure of Earth ; Crust , Mantle & Core	01	
			*Part of the Earth – As a planet Atmosphere	01	
			* Lithosphere	01	
			* Hydrosphere composition	01	
			* Earthquakes causes	01	14
			*Types ,Scale of Intensity, Recording	02 01	
			*Radiation in the Atmosphere	01	
			*Propagation of Energy through vacuum	02	
			* Intensity , scattering absorption & Reflection	01	
			* Moisture and Clouds (mechanism)	02	
			*Cloud produced by mixing and cooling		

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Sr. No.	Month	Name of Unit	Topics	Required Lect.	Total Lect.
1	Dec./Jan.	Unit-I Geometrical optic and interference	* Cardinal points of an system	01	12
			* Equivalent focal length of coaxial lens system	02	
			* Principle of superposition (light)	01	
			* Thin films	03	
			* Expression for fringe width	01	
			* Newton's ring	04	
2	Dec./Jan.	Unit:-II Diffraction of light	* Fresnel diffraction	01	14
			*Fraunhofer diffraction	01	
			* Diff. bet^n. F-F diffraction	01	
			*Fresnel assumption , half period zone	01	
			* Zone plate construction	01	
			*comparison of zone plate with convex lens	01	
			* Fraunhofer diff. due to double slit	01	
			* Plane diff. grating	01	
			* Elementary theory of grating	01	
			*Maximum number of orders available with grating	01	
			*Determination of wavelength of light	01	
			*Resolution of images	01	
			*Rayleigh's criteria for resolution	01	
			*Resolving power of grating	01	
3	Feb./Mar.	Unit:-III Polarization of light	* Concept of polarization	01	11
			* Optic axis	01	
			* Double refraction , Brewster's law	01	
			* Positive and Negative crystal	01	
			* Phase retardation plate ,Half and Quarter	02	
			* Nicol prism , Polarizer and Analyzer	01	
			*Plane , circularly and Elliptically polarized light	02	
			*Half shade polarimeter	01	
			*Blue colour of the sky	01	
4	Feb./Mar.	Unit:-IV Laser	*Absorption , Spontaneous and stimulated emission	01	
			* Population inversion , pumping	01	
			* MASER	01	
			*Chara. of laser , laser system	01	
			* Three and four level laser system.	01	
			* Ruby and He-Ne laser	01	
			*Holography & Recording and reprod.	01	08
				01	

			* Semiconductor laser		
5	April	Unit:-V Fiber optics	* Total internal reflection * Structure of optical fiber * Classification of optical fiber * Propagation of light in optical fiber * Acceptance angle and numerical apt. *Dispersion and Fiber losses * Fiber optic communication * Advantages of optical fiber	01 01 01 01 01 02 01 01	09
6	April	Unit–VI Renewable energy sources	*Solar energy , wind energy, ocean en. *Geothermal energy , hydrogen energy *Fuel cell , Biomass energy *Solar energy and its availability *Seasonal variation , solar constant, spt *Measurement of solar radiation * Solar energy storage *Solar photovoltaic system, PV cell *Thin film photovoltaic cell * solar PV panel and Application	01 01 01 01 01 01 02 01 01 02	12

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Department of Physics
Teaching Plan Session:- 2022-23
Name :- Mr. Sharique S. Shaikh & Mr. Pavan Kolhe   Class:**-**B.Sc. IIIrd Year /Sem. V
Subject:- Physics
Paper:-5S-Quantum mechanics, Atomic spectroscopy ,Nuclear physics , hybrid parameters.

Sr. No.	Month	Name of Unit	Topics	Required Lect.	Total Lect.
1	July	Unit-I Origin of Quantum Mechanics	*Historical background, Failure of classical theory in explaining	01	14
			*Black body radiation & Photoelectric effect	01	
			* Compton effect qualitative analysis	02	
			* Assumption of Plank's quantum theory	01	
			* Wave Particle Duality		
			* De-Broglie Hypothesis	01	
			* Davisson Germer expt.	01	
			*Concept of Wave packet, Phase velocity , Group velocity relation	01	
			* Heisenberg's uncertainty principal	02	
			* Different forms	01	
			* Thought expt.Gamma ray microscope	01	
				02	
2	July/Aug.	Unit :- II The Schrodinger equation and its applications	* Wave function and its physical significance	01	12
			* Schrodinger time dependent equation	01	
			* Separation in time dependent and time independent parts	01	
			* Operators in quantum Mechanics	01	
			* Eigen functions and Eigen values	02	
			* Particle in one dimensional and three dimensional box (Energy eigen values)	02	
			* Qualitative analysis of potential barrier Tunneling effect)	02	
			* Simple Harmonic Oscillator (Qualitative analysis of Zero point	02	
3	Aug./Sep	Unit- III Atomic and Molecular Spectroscopy	*Vector Atom Model: Quantum Numbers,	01	11
			*Stern- Gerlach experiment;	02	
			*selection rules, l-s and j-j coupling	01 01	
			*Types of spectra – Emission & absorption spectra.	01	
			*X-rays: Continuous X-ray spectrum, *Duane and Hunt's law,	01 01	
			*characteristic X-ray spectra,		
			*Mosley's law	01	

			*Raman Effect**: stoke's and anti-stoke's lines,	01	
			*Quantum theory of Raman effect, Experimental Arrangement for Raman Spectroscopy.	01	
4	Aug./Sept.	Unit:-IV Nuclear Physics	*Detection of charged particles;	01	
			*G. M. counter,	02	
			*Binding energy and Mass defect, stability of nuclei	02	
			*Alpha Decay: Range of Alpha particles, *Geiger - Nuttal law and Gamow's explanation of alpha decay (qualitative)*Beta decay: Types and Pauli's Neutrino Hypothesis	01	13
				02	
				02	
				02	
			*Nuclear Fission, Nuclear fusion (concepts only),	02	
			*Nuclear reactors.	01	
5	Sep./Oct.	Unit:-V Hybrid parameters	*Hybrid parameters	01	
			*low frequency equivalent of CE amplifier & its analysis.,	02	
			*Bias stability & thermal runway qual.	02	
			*General principles of amplifier classification,	01	12
			*RC coupled amplifier,	01	
			*Equivalent circuits & gain at low, medium & high frequency (qualitative),	02	
			*Gain-frequency response.	01	
			*Noise & distortion in electronic circuits.	02	
6	Sep./Oct	Unit :- VI Feedback in amplifiers	*Feedback in amplifiers- Negative feedback,	01	
			*Advantages of negative feedback,	01	
			*positive feedback.	01	10
			*Phase shift, and Wein bridge	02	
			*Hartley & Colpits Oscillators.	02	
			*Multi-vibrators – astable, monostable & bistable.	03	

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Department of Physics
Teaching Plan Session:- 2022-23
Name :- Mr. Sharique S. Shaikh & Mr. Pavan Kolhe   Class:-B.Sc. IIIrd Year /Sem. VI
Paper:- (6S) Statistical mechanics & solid state physics

Sr. No.	Month	Name of Unit	Topics	Required Lect.	Total Lect.
1	Dec./Jan	Unit-I Statistical mechanics	*Phase space , Unit cell	01	09
			*Microstates and Macro states	01	
			*Energy states, Density of Energy states	01	
			*Probability and most probable distribution	02	
			*Boltzman entropy relation	01	
			*Maxwell-Boltzman relation	01	
			*Molecular speed distribution	01	
			* r.m.s. speed and most probable velocity	01	
2	Dec./Jan	Unit :- II Bose-Einstein statistics	*Distinguishable& Indistinguishable particles	02	10
			* Concept of boson and fermions	01	
			* Bose-Einstein statistics	02	
			* Black body radiation	01	
			*Fermi-Dirac distribution	01	
			* Fermi function	01	
			* Fermi energy	01	
			*Fermi temp.	01	
3	Jan.	Unit:-III Crystallography	*Crystalline and Amorphous materials	01	11
			* Unit cell	01	
			* Miller indices	01	
			*Types of lattice	01	
			* Coordination number	01	
			* Diffraction of lattice parameter	01	
			* Diffraction of X-rays by crystal	01	
			*Bragg's law	01	
			*Reciprocal lattice	01	
			*Defects in solids	02	

4	Jan./Feb	Unit:-IV Electrical properties of material	* Motion of electron	01	
			* Electrical conductivity	01	
			* Expn. For electrical conductivity and ohm's law	02	
			* Fermi energy and density of states	01	
			* Electron in periodic potential	01	
			* Bloch theorem	01	10
			*Energy band , energy gap	01	
			* Free electron model		
			*Conductor's ,insulator's, semiconductor's	01 01	
5	Feb./Mar	Unit:-V Magnetic properties of materials	* Atomic magnetic moment	01	
			*Magnetization vector (M)	01	
			* Magnetic susceptibility	01	
			* Diamagnetism, Paramagnetic, Ferromagnetism	01	
			* Dia. Para-,and ferromagnetic materials	01	13
			* Langevin's theory of diamagnetism	02	
			* Langevin's theory of Para magnetism	02	
			* Quantum mechanical treatment of Para magnetism	01	
			*Curie-Weiss's law	01	
			*Hysteresis and energy loss	01 01	
6	Feb./Mar.	Unit–VI Superconductivity and Nanotechnology	*Superconductivity	01	
			*Critical temp. and critical magnetic field	01	
			*Meissner effect *Type I and Type II Superconductor.	01 01	
			*BCS Theory, cooper pair		
			*Application of superconductor's	02 01	12
			*Effect of reduction of dim. of physical properties	01	
			*History of nanotechnology	01	
			*Quantum size effect	01	
			*Application of Nano materials	01	

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