Government College, Mangali
LESSON PLAN- EVEN SEMESTER

Name of Teacher : Dr. Manjeet Singh   **Session: 2023-24**

Subject: Physics   Class: B. Sc. 2nd Semester   **Nomenclature of Paper: Mechanics-II**   **Paper Code: CPL-202**

Week	YEAR-2024 01-30/04	Description of Chapter/Topic	Assignment/Test/Quiz/Practical
1	01 JAN-06 JAN	**UNIT-1** Constrained motion, Degree of freedom and Generalized coordinates, Generalized displacement, velocity, acceleration.	
2	08 JAN -13 JAN	Generalized momentum, force and potential, Hamilton's variational principle	
3	15 JAN-20 JAN	Lagrange's equation of motion from Hamilton's principle	
4	22 JAN-27 JAN	Application of Lagrange's equation for simple problems of mechanics, Simple harmonic motion	
5	29 JAN -03 FEB	**UNIT-2** Simple harmonic motion, Simple pendulum, Compound Pendulum	
6	05 FEB - 10 FEB	Differential equation of SHM and its solutions	
7	12 FEB - 17 FEB	Kinetic and Potential Energy, Total Energy and their time averages,	
8	19 FEB -24 FEB	Damped oscillations, Forced oscillations	
9	26 FEB -02 MAR	**UNIT-3** Inertial and non-inertial frame of references , Galilean transformation (velocity, acceleration) and its inadequacy	
10	04 MAR-09 MAR	Michelson-Morley Experiment and its outcome	
11	11 MAR-16 MAR	Postulates of Special Theory of Relativity, Lorentz Transformations	
12	18 MAR-23 MAR	Length contraction, Time dilation	
13	25 MAR-30 MAR	**HOLI VACATION**	
14	01 APR -06 APR	**UNIT-4** Relativistic transformation of velocity, frequency and wave number	
15	08 APR- 13 APR	Variation of mass with velocity, Massless Particles , Mass-energy Equivalence	
16	15 APR- 20 APR	Relativistic Doppler effect , Relativistic Kinematics, Transformation of Energy and Momentum, Four Vectors	
17	22 APR -30 APR	REVISION PRACTICE/TEST/ASSIGNMENTS	

Name of Teacher : Dr. Manjeet Singh   **Class: B. Sc. 2nd Semester**   **Session: 2023-24**
Subject: Physics   Nomenclature of Paper: ELECTRICITY, MAGNETISM & ELECTROMAGNETIC THEORY-II Paper Code: CPL-203

Week	YEAR-2024 01-30/04	Description of Chapter/Topic	Assignment/Test/Quiz/Practical
1	01 JAN-06 JAN	**UNIT-1** Motional EMF, Faraday's laws of electromagnetic induction, Self and mutual inductance (L and respectively)	
2	08 JAN -13 JAN	Energy stored in magnetic field, AC circuit analysis using complex variables	
3	15 JAN-20 JAN	AC circuits with (a) R and C (b) R and L (c) R, L and C	
4	22 JAN-27 JAN	Series and parallel resonance circuits, Quality factors and its importance	
5	29 JAN -03 FEB	**UNIT-2** Maxwell's fixing of Ampere's law, Displacement current	
6	05 FEB - 10 FEB	Maxwell's equations in vacuum, Maxwell's equations in matter	
7	12 FEB - 17 FEB	The continuity equation, Poynting Theorem and Poynting vector	
8	19 FEB -24 FEB	Week 4:-, Momentum and angular momentum in electromagnetic field (qualitative only) , Energy density in electromagnetic field.	
9	26 FEB -02 MAR	**UNIT-3** The wave equation, Sinusoidal waves, Wave equations for **E** and **B** fields	
10	04 MAR-09 MAR	Electromagnetic wave propagation through vacuum and isotropic dielectric medium,	
11	11 MAR-16 MAR	Transverse nature of EM waves, Energy and momentum in EM waves,	
12	18 MAR-23 MAR	Propagation in linear media, Reflection and transmission at Normal and Oblique incidence, Brewster's angle.	
13	25 MAR-30 MAR	**HOLI VACATION**	
14	01 APR -06 APR	**UNIT-4**Scalar and vector potential for electromagnetic fields, Gauge Transformation, Coulomb Gauge, Lorentz Gauge	
15	08 APR- 13 APR	Electric and magnetic dipole radiation (no derivation needed, discussion of results only), Magnetism as relativistic phenomenon	
16	15 APR- 20 APR	Transformation of electric and magnetic fields between two inertial frames	
17	22 APR -30 APR	REVISION PRACTICE/TEST/ASSIGNMENTS	

Name of Teacher : Dr. Manjeet Singh			**Session: 2023-24**
Subject: Physics Class: B. Sc. 4th Semester		**Nomenclature of Paper: Statistical Mechanics**	**Paper Code: CPL-402**
Week	**YEAR-2024 01-30/04**	**Description of Chapter/Topic**	Assignment/Test/Quiz/Practical
1	01 JAN-06 JAN	**UNIT-1** Statistical Basis, Probability and Frequency, Permutations and Combinations, Distribution of n distinguishable and indistinguishable particles in two boxes, Macrostate and Microstate, Thermodynamic Probability	
2	08 JAN -13 JAN	Fluctuations and their Dependence on n : (narrowing of probability distribution with increasing n), Constraints on a System, Static and dynamics system, most probable state, Concept of cell in a compartment	
3	15 JAN-20 JAN	Concept of Ensembles and type of Ensembles (Qualitative Idea only), Fundamental Postulates of Statistical Mechanics, Density of Quantum states of energy of a particle, Entropy and thermodynamics Probability,	
4	22 JAN-27 JAN	Statistical Interpretation of 2nd law of thermodynamics, Week 4:- Partition function and Relation with Thermodynamics Quantities	
5	29 JAN -03 FEB	**UNIT-2** Maxwell-Boltzmann Law of Distribution of Particle speed in an Ideal Gas and its Experimental Verification	
6	05 FEB - 10 FEB	Mean, RMS and Most Probable Speeds, Mean Free Path. Collision Probability. Brownian Motion and its Significance.	
7	12 FEB - 17 FEB	Estimates of Mean Free Path, Transport Phenomenon in Ideal Gases: (1) Viscosity, (2) Thermal Conductivity (3) Diffusion	
8	19 FEB -24 FEB	Equipartition Law: Degrees of Freedom, Law of Equipartition of Energy (No proof required) and its application to the specific heat of monoatomic and diatomic gases and its limitations	
9	26 FEB -02 MAR	**UNIT-3** Phase space and Application to One Dimension Harmonic Oscillator and Free particle	
10	04 MAR-09 MAR	Division of phase space into cells, Basic approach in three statistics, Maxwell-Boltzmann Distribution Law,	
11	11 MAR-16 MAR	Thermodynamic Functions of Finite Number of Energy Levels	
12	18 MAR-23 MAR	Negative Temperature, Thermodynamic Functions of an Ideal Gas, Classical Entropy Expression, Gibbs Paradox	
13	25 MAR-30 MAR	**HOLI VACATION**	
14	01 APR -06 APR	**UNIT-4** B.E. distribution law, Thermodynamic functions of a Completely Degenerate Bose Gas. Bose-Einstein condensation	
15	08 APR- 13 APR	Properties of liquid He (qualitative description), Radiation as photon gas , Bose's derivation of Planck's law	
16	15 APR- 20 APR	Fermi-Dirac Distribution Law, Thermodynamic functions of an ideal Completely Degenerate, Fermi Gas, Fermi Energy,	
17	22 APR -30 APR	Electron gas in a Metal, Specific Heat of Metals, Comparison of three statistics M-B, B-E and F-D. And Revision	

Name of Teacher : Dr. Manjeet Singh			**Session: 2023-24**
Subject: Physics Class: B. Sc. 4th Semester		**Nomenclature of Paper: Waves & Optics**	**Paper Code: CPL-403**
Week	**YEAR-2024 01-30/04**	**Description of Chapter/Topic**	Assignment/Test/Quiz/Practical
1	01 JAN-06 JAN	**UNIT-1** Wave Equation, Solution of wave equation, Particle and Wave Velocities, Intensity of Wave, Superposition Principle, Group velocity, Phase velocity	
2	08 JAN -13 JAN	The string as a force oscillator, Velocity of Transverse Vibrations of Stretched Strings, Reflections and transmission of waves on a string at a boundary, Transverse waves on a string	
3	15 JAN-20 JAN	Travelling and standing waves on a string, Normal Modes of a string, Reflections and transmission of Energy, Velocity of Longitudinal Waves in a Fluid in a Pipe, Newton's Formula for Velocity of Sound	
4	22 JAN-27 JAN	Laplace's Correction (qualitative), Reflections and transmission of sound waves at a boundary, Energy distribution in sound waves	
5	29 JAN -03 FEB	**UNIT-2** Division of amplitude and division of wave front, Young's Double Slit experiment,	
6	05 FEB - 10 FEB	Lloyd's Mirror and Fresnel's Biprism, Newton's Rings: measurement of wavelength and refractive index	
7	12 FEB - 17 FEB	Stokes' treatment, Interference in Thin Films: parallel and wedge-shaped films,	
8	19 FEB -24 FEB	Fresnel's Assumptions, Fresnel's Half-Period Zones for Plane Wave	
9	26 FEB -02 MAR	**UNIT-3** Fresnel's Assumptions, Fresnel's Half-Period Zones for Plane Wave, Rectilinear Propagation of Light,	
10	04 MAR-09 MAR	Theory of a Zone Plate and its application, Multiple Foci of a Zone Plate ,	
11	11 MAR-16 MAR	Qualitative description for Fresnel diffraction pattern of a straight edge, a slit and a wire	
12	18 MAR-23 MAR	Fraunhofer diffraction: Single slit, Double slit multiple slits and 'n' multiple slits, Diffraction grating and it's resolving power, Rayleigh Criteria of the limit of resolution and Resolving Power of a telescope.	
13	25 MAR-30 MAR	**HOLI VACATION**	
14	01 APR -06 APR	**UNIT-4** Polarization: Plane polarized light – production and analysis, Circular and elliptical polarization	
15	08 APR- 13 APR	Optical activity, Specific Rotation, Fibre Optics: Optical Fibres - Construction and working,	
16	15 APR- 20 APR	Critical angle of propagation, Modes of propagation, Acceptance angle, Attenuation. Advantages and applications of Optical Fibre	
17	22 APR -30 APR	REVISION PRACTICE/TEST/ASSIGNMENTS	

Name of Teacher : Dr. Manjeet Singh **Session: 2023-24** **Paper Code: CPS-409**
Subject: Physics Class: B. Sc. 4th Semester **Nomenclature of Paper: Skill Enhancement Course-I (Electrical Circuits and Network Skill)**

Week	YEAR-2024 01-30/04	Description of Chapter/Topic	Assignment/Test/Quiz/Practical
1	01 JAN-06 JAN	**UNIT-1** Electronic components. Passive components. Resistors and their types. Color coding of resistors. Troubles in resistors..	
2	08 JAN -13 JAN	Capacitors and their types. Troubles in capacitors. Inductors and their types. Troubles in inductors. Internal resistance and impedance.	
3	15 JAN-20 JAN	Types of Electrical switches. "Single-pole Single-throw" (SPST) switch. "Single-pole Double-throw" (SPDT) switch.	
4	22 JAN-27 JAN	"Double-pole Double-throw" (DPDT) switch. Application of SPST , SPDT and DPDT switches	
5	29 JAN -03 FEB	**UNIT-2** Relays. Fuses and disconnect switches. Circuit breakers.	
6	05 FEB - 10 FEB	Overload devices. Ground-fault protection. Grounding and isolating.	
7	12 FEB - 17 FEB	Construction and working of MCB & MCCB and their uses. Different types of conductors and cables.	
8	19 FEB -24 FEB	Basics of wiring - Star and delta connection. Voltage drop and losses across cables and conductors. Insulation. Solid and stranded cable. Preparation of extension board	
9	26 FEB -02 MAR	**UNIT-3** Real (practical) and ideal voltage source. Real (practical) current source.	
10	04 MAR-09 MAR	Conversion of voltage source into current source or vice-versa	
11	11 MAR-16 MAR	Maximum power transfer theorem. Thevenin theorem and norton's theorem.	
12	18 MAR-23 MAR	Familiarization with multimeter. Voltmeter and ammeter. AC source -single phase and three phase alternating current sources. Measurement of energy consumption in AC circuits.	
13	25 MAR-30 MAR	**HOLI VACATION**	
14	01 APR -06 APR	Difference between Analog and Digital Circuits, Binary Numbers, Decimal to Binary and Binary to Decimal Conversion,	
15	08 APR- 13 APR	AND, OR and NOT Gates, Realization of AND, OR and NOT Gates using Diodes,	
16	15 APR- 20 APR	resistances and Transistor, NAND and NOR Gates as Universal Gates, Realization of AND, OR and NOT Gates using NAND Gates only and NOR Gates only, XOR gates, XNOR Gates,De Morgan's Theorems, Boolean Laws.	
17	22 APR -30 APR	REVISION PRACTICE/TEST/ASSIGNMENTS	

Name of Teacher : Dr. Manjeet Singh   **Session: 2023-24**

Subject: Physics   Class: B. Sc. 6th Semester   **Nomenclature of Paper: Solid State Physics**   **Paper Code: CPL-601**

Week	YEAR-2024 01-30/04	Description of Chapter/Topic	Assignment/Test/Quiz/Practical
1	01 JAN-06 JAN	**UNIT-1** Crystalline and glassy forms, liquid crystals, crystal structure, periodicity, lattice and basis, crystal translational vectors and axes.	
2	08 JAN -13 JAN	Unit cell and Primitive Cell, Winger Seitz primitive Cell, symmetry operations for a two dimensional crystal,	
3	15 JAN-20 JAN	Bravais lattices in two and three dimensions. Crystal planes and Miller indices, Interplaner spacing,	
4	22 JAN-27 JAN	Crystal structures of Zinc Sulphide, Silicon, Sodium Chloride and Diamond.	
5	29 JAN -03 FEB	**UNIT-2** X-ray diffraction, Bragg's Law and experimental X-ray diffraction methods.	
6	05 FEB - 10 FEB	K-space and reciprocal lattice and its physical significance, reciprocal lattice vectors, reciprocal lattice to a simple cubic lattice, B.C.C and F.C.C.	
7	12 FEB - 17 FEB	Lattice vibrations: Phonon concept, Vibration of monoatomic and diatomic lattice,	
8	19 FEB -24 FEB	Acoustical and optical modes, Dispersion relation for phonons, Dulong and Petit's Law, Einstein and Debye theories of specific heat of solids, Debye T^3 law.	
9	26 FEB -02 MAR	**UNIT-3** Band Theory: Free electron gas models, Nearly free electron model, Bloch function,	
10	04 MAR-09 MAR	Kronig Penny model, Velocity and Effective mass of electron	
11	11 MAR-16 MAR	Distinction between metals, semiconductors and insulators, Hall Effect	
12	18 MAR-23 MAR	Magnetic Properties of Matter: Dia-, Para-, Ferromagnetic Materials, Classical Langevin Theory of dia - and Paramagnetic Domains, Curie's law	
13	25 MAR-30 MAR	**HOLI VACATION**	
14	01 APR -06 APR	**UNIT-4 Superconductivity:** Historical introduction, Survey of superconductivity, Super conducting systems,	
15	08 APR- 13 APR	High Tc Super conductors, Isotopic Effect, Critical Magnetic Field, Meissner Effect,	
16	15 APR- 20 APR	London Theory and Penetration Depth, Classification of Superconductors (type I and Type II), BCS Theory of Superconductivity,	
17	22 APR -30 APR	Flux quantization, Josephson Effect (AC and DC), Practical Applications of superconductivity and their limitations.	

Name of Teacher : Dr. Manjeet Singh			**Session: 2023-24**
Subject: Physics Class: B. Sc. 6th Semester		**Nomenclature of Paper: Quantum Mechanics**	**Paper Code: CPL-602**
Week	**YEAR-2024 01-30/04**	**Description of Chapter/Topic**	Assignment/Test/Quiz/Practical
1	01 JAN-06 JAN	**UNIT-1** Wave function and its physical significance, Properties of wave-function, Orthogonality and Normalization of wave function	
2	08 JAN -13 JAN	Time dependent Schrodinger wave equation, Time Independent Schrodinger Equation, Momentum and Energy operators	
3	15 JAN-20 JAN	Hermitian Operators- Eigenvalue and Eigen functions, Commutator relations of various operators, Stationary states; Probabilities and normalization, Probability current densities and its relation to wavefunction	
4	22 JAN-27 JAN	Expectation Values of Dynamical quantities, Particle in 1-dimention Infinite Square Well (Energy levels and general Wavefunction)	
5	29 JAN -03 FEB	**UNIT-2** Application of Schrodinger: Solution of Schrodinger Equation for the Finite Potential Well	
6	05 FEB - 10 FEB	1-Dimention Harmonic Oscillator problem - Algebraic and Analytical solutions	
7	12 FEB - 17 FEB	Free particle and concept of group velocity, Tunneling through finite potential barrier - Examples of alpha decay and tunnel diodes (qualitative only)	
8	19 FEB -24 FEB	Generalized uncertainty principles for Position-Momentum and Energy	
9	26 FEB -02 MAR	**UNIT-3** Larmor's precession, Spectroscopic terms and their notation, Selection rule,	
10	04 MAR-09 MAR	Orbital magnetic dipole moment (Bohr magneton), Coupling scheme; LS or Russel-Saunders Coupling scheme	
11	11 MAR-16 MAR	JJ coupling scheme, Pauli principal, Hyperfine structure of spectral lines and its origin,	
12	18 MAR-23 MAR	Isotopic effect, Atom in external magnetic field; Normal Zeeman effect	
13	25 MAR-30 MAR	**HOLI VACATION**	
14	01 APR -06 APR	**UNIT-4** Rotational spectra of diatomic molecules as rigid rotator, Intensity of rotational lines,	
15	08 APR- 13 APR	Energy levels, Rotational spectra of diatomic molecules as non-rigid rotator	
16	15 APR- 20 APR	Vibrational spectra, Vibrational-Rotational	
17	22 APR -30 APR	Raman and electronic spectra of molecules: Vibrational energy of diatomic molecules, Molecules as Harmonic Oscillator	