Lesson Plan
Department of Physics
Session 2021-22(Even Sem)

Name of Extension Lecturer : Ms. Komal Rani

Class : B.Sc.-I (NM) **Subject: Mechanics-II(CPL-202)**

Month	**Topics Covered**
April	**UNIT-I** Constrained motion, Degree of freedom and Generalized coordinates, Generalized displacement,velocity, acceleration, momentum, force and potential, Hamilton's variational principle, Lagrange's equation of motion from Hamilton's principle, Application of Lagrange's equation for simple problems of mechanics.
May	**UNIT-II** Oscillations: Simple harmonic motion, Simple pendulum , Compound Pendulum, Differential equation of SHM and its solutions. Kinetic and Potential Energy, Total Energy and their time averages, Damped oscillations, Forced oscillations. **UNIT-III** Theory of Relativity: Inertial and non-inertial frame of references, Galilean transformation (velocity, acceleration) and its inadequacy, Michelson-Morley Experiment and its outcome, Postulates of Special Theory of Relativity, Lorentz Transformations, Length contraction, Time dilation.
June	**UNIT-IV** Application of Relativity: Relativistic transformation of velocity, frequency and wave number, Variation of mass with velocity, Massless Particles, Mass-energy Equivalence, Relativistic Doppler effect, Relativistic Kinematics, Transformation of Energy and Momentum, Four Vectors.
July	**Revision**

Lesson plan

Class: B.Sc. Ist Non medical with Computer Science

Name : Monika Dhariwal

Month	Mechanics	Electricity, magnetism and Electromagnetic theory
April	Constrained motion, Degree of freedom and generalized coordinates, Generalized displacement,velocity, acceleration, momentum, force and potential, Hamilton's variational principle, Lagrange's equation of motion from Hamilton's principle, Application of Lagrange's equation for simple problems of mechanics, Simple harmonic motion, Simple pendulum Compound Pendulum, Differential equation of SHM and its solutions. Kinetic and Potential Energy, Total Energy and their time averages, Damped oscillations Forced oscillations .	Electromagnetic Induction:Motional EMF, Faraday's laws of electromagnetic induction,Self and mutual inductance (L and M respectively) Energy stored in magnetic field. AC Circuit Analysis: AC circuit analysis using complex variables, AC circuits with (a) R and C (b) R and L (c) R, L and C, Series and parallel resonance circuits, Quality factors and its importance
May	Inertial and non-inertial frame of references, Galilean transformation (velocity, acceleration) and its inadequacy Michelson-Morley Experiment and its outcome Postulates of Special Theory of Relativity Lorentz Transformations, Length contraction, Time dilation	Maxwell`sequations: Maxwell's fixing of Ampere's law, Displacement current, Maxwell's equations in vacuum, Maxwell's equations in matter, (The continuity equation, Poynting Theorem and Poynting vector , Momentum and angular momentum in electromagnetic field (qualitative only), Energy density in electromagnetic field
June	Relativistic transformation of velocity , frequency and wave number, Variation of mass with velocity Massless Particles, Mass-energy Equivalence, Relativistic Doppler effect , Relativistic Kinematics, Transformation of Energy and Momentum, Four Vectors	The wave equation, Sinusoidal waves , Wave equations for E and B fields, Electromagnetic wave propagation through vacuum and isotropic dielectric medium, transverse nature of EM waves, Energy and momentum in EM waves, Propagation in linear media Reflection and transmission at Normal and Oblique incidence Brewster's angle, Scalar and vector potential for electromagnetic fields, Gauge Transformation Coulomb Gauge, Lorentz Gauge , Electric and magnetic dipole radiation (Magnetism as relativistic phenomenon, Transformation of electric and magnetic fields between two inertial frames

Lesson plan

Class: B.Sc. IInd Non medical with Computer Science

Name : Monika Dhariwal

Month	Electrical Circuits and network Skill
April	Electronic components. Passive components. Resistors and their types. Color coding of resistors. Troubles in resistors. Capacitors and their types. Troubles in capacitors. Inductors and their types. Troubles in inductors. Internal resistance and impedance.Types of Electrical switches. “Single-pole Single-throw” (SPST) switch. “Single-pole Double-throw” (SPDT) switch. “Double-pole Double-throw” (DPDT) switch. Application of SPST , SPDT and DPDT switches.
May	Relays. Fuses and disconnect switches. Circuit breakers. Overload devices. Ground-fault protection. Grounding and isolating. Construction and working of MCB & MCCB and their uses. Different types of conductors and cables. Basics of wiring - Star and delta connection. Voltage drop and losses across cables and conductors.. Insulation. Solid and stranded cable. Preparationofextensionboard.
June	Real (practical) and ideal voltage source. Real (practical)current source. Conversion of voltage source into current source or vice-versa Maximum power transfer theorem. Thevenin theorem and norton’s theorem. Familiarization with multimeter. Voltmeter and ammeter. AC source -single phase and three phase alternating current sources. Measurement of energy consumption in AC circuits. Digital Circuits: Difference between Analog and Digital Circuits, Binary Numbers, Decimal to Binary and Binary to Decimal Conversion, AND, OR and NOT Gates, Realization of AND, OR and NOT Gates using Diodes, 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.

LESSON PLAN

B.Sc. II N.M. IV Semester (2021-22)

Waves and Optics (CPL-403) and Statistical Physics (CPL-402) to be taught by Ms. Poonam Devi

Month	Topics to be covered
April-2022	• Statistical Basis of Thermodynamics: - Statistical Basis, Probability and Frequency, Permutations and Combinations, Distribution of n distinguishable and indistinguishable particles in two boxes, Macrostate and Microstate, Thermodynamic Probability, 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, Concept of Ensembles and type of Ensembles (Qualitative Idea only) Universal Law in Statistics: - Fundamental Postulates of Statistical Mechanics, Density of Quantum states of energy of a particle, Entropy and thermodynamics Probability, Statistical Interpretation of 2nd law of thermodynamics, Partition function and Relation with Thermodynamics Quantities. • Kinetic Theory of Gases: - Maxwell-Boltzmann Law of Distribution of Particle speed in an Ideal Gas and its Experimental Verification, Mean, RMS and Most Probable Speeds. Molecular Collisions: - Mean Free Path. Collision Probability, Estimates of Mean Free Path, Transport Phenomenon in Ideal Gases: (1) Viscosity, (2) Thermal Conductivity (3) Diffusion. Brownian Motion and its Significance. 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. • Wave Motion: Wave Equation, Solution of wave equation, Particle and Wave Velocities, Intensity of Wave, Superposition Principle, Group velocity, Phase velocity Transverse Waves: 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, Travelling and standing waves on a string, Normal Modes of a string, Reflections and transmission of Energy. Longitudinal Waves: Velocity of Longitudinal Waves in a Fluid in a Pipe, Newton's Formula for Velocity of Sound, Laplace's Correction (qualitative), Reflections and transmission of sound waves at a boundary, Energy distribution in sound waves.
May-2022	• Classical Statistics: - Phase space and Application to One Dimension Harmonic Oscillator and Free particle, Division of phase space into cells, Basic approach in three statistics, Maxwell-Boltzmann Distribution Law, Thermodynamic Functions of Finite Number of Energy Levels, Negative Temperature, Thermodynamic Functions of an Ideal Gas, Classical Entropy Expression, Gibbs Paradox. • Interference: Division of amplitude and division of wave front, Young's Double Slit experiment, Lloyd's Mirror and Fresnel's Biprism, Phase change on reflection: Stokes' treatment, Interference in Thin Films: parallel and wedge-shaped films, Newton's Rings: measurement of wavelength and refractive index. • Diffraction: Fresnel Diffraction: Fresnel's Assumptions, Fresnel's Half-Period Zones for Plane Wave, Rectilinear Propagation of Light, Theory of a Zone Plate and its application, Multiple Foci of a Zone Plate, Qualitative description for Fresnel diffraction pattern of a straight edge, a slit and a wire. 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.
June-2022	• Bose-Einstein Statistics: - B.E. distribution law, Thermodynamic functions of a Completely Degenerate Bose Gas, Bose-Einstein condensation, properties of liquid He (qualitative description), Radiation as photon gas, Bose's derivation of Planck's law. Fermi-Dirac Statistics: - Fermi-Dirac Distribution Law, Thermodynamic functions of an ideal Completely Degenerate, Fermi Gas, Fermi Energy, Electron gas in a Metal, Specific Heat of Metals, Comparison of three statistics M-B, B-E and F-D. • Polarization: Plane polarized light – production and analysis, Circular and elliptical polarization, Optical activity, Specific Rotation Fibre Optics: Optical Fibres - Construction and working, Critical angle of propagation, Modes of propagation, Acceptance angle, Attenuation. Advantages and applications of Optical Fibre.

Lesson Plan

Even Semester (2021 – 2022)

Name: Dr. Kavita

Class: B.Sc. IInd Computer Science

Papers: Waves and Optics , Statistical Mechanics

April 2022

Wave motion: wave equation, solution of wave equation, particle and wave velocities, intensity of wave, superposition principle, group velocity, phase velocity.

Transverse waves: the string as a first oscillator, velocity of transverse vibrations of stretched strings, reflections and transmissions of waves on a string at a boundary, transverse wave on a string, travelling and standing waves on a string, normal modes of a string, reflections and transmission of energy

Longitudinal wave: velocity of longitudinal waves in a fluid in a pipe, Newton's formula for velocity of sound, Laplace's correction (qualitative), reflections and transmission of sound waves at a boundary, energy distribution in sound waves.

Interference: division of amplitude and division of wave front, Young's double slit experiment, Lloyd's mirror and Fresnel's Biprism,, phase change on reflection : Stokes' measurement of wave length and refractive index.

Test 1 & Assignment 1

Statistical basis of thermodynamics: statistical basis, probability and frequency, permutations and combinations, distribution of an distinguishable and indistinguishable particles in two boxes, Macrostate and microstate, thermodynamics probability, fluctutations and their dependence on n: (narrowing of probability distribution with increasing n), constraints on a system, static and dynamic system, most probable state, concept of cell in compartment, concept of ensembles and type of ensembles (qualitative idea only).

Universal law in statics: fundamental postulates of statistical mechanics, density of quantum states of energy of a particle, entropy and thermodynamics probability, statistical interpretation of 2^{nd} law of thermodynamics, partition function and relation with thermodynamics quantities

Kinetic theory of gases: Maxwell- Boltzmann law of distribution of particle speed in an ideal gas and its experimental verification, mean, RMS and most probable speeds.

Molecular collisions: Mean free path, Collision probability, estimates of mean free path, transport phenomenon in ideal gases: (1) viscosity, (2) thermal conductivity, (3) diffusion browning motion and its significance.

Equipartition law: degrees of freedom, law of equipartition of energy (no proof required) and its applications to the specific heat of monoatomic and diatomic gases and its limitations

May 2022

Diffraction: Fresnel diffraction: Fresnel's assumptions, Fresnel's half- period zones for plane wave, rectilinear propagation of light, theory of a zone plate and its applications, multiple foci of a zone plate, qualitative description for Fresnel diffraction pattern of a straight edge, a slit and a wire.

Fraunhofer diffraction: single slit , double slit multiple slits and 'n' multiple slits, diffraction grating and it's resolving power, ray light criteria of the limit of resolution and resolving power of a telescope.

Polarization: plane polarized light – production and analysis , circular and elliptical polarization, optical activity, specific rotation.

Fibre optics: optical Fibre – construction and working, critical angle of propagation, modes of propagation, acceptance angle, attenuation. Advantages and applications of optical fibre.

Test 2 & Assignment 2

Classical statics: phase space and application to one dimension harmonic oscillator and free particle, division of phase space into cells, basis approach in three statics, Maxwell – Boltzmann distribution law, thermodynamics functions of finite numbers of energy levels, negative temperature, thermodynamics functions of an ideal gas, classical entropy expression, Gibbs paradox.

Bose- Einstein statistics: B.E. distribution law, thermodynamics functions of a completely degenerate Bose gas, Bose- Einstein condensation, properties of liquid He (quantative description), radiations as photon gas, Bose's derivation of plank's law.

Fermi- dirac statistics: Fermi- dirac distribution law, thermodynamic functions of an ideal completely degenerate, Fermi gas, Fermi energy, electron gas in a metal, specific heat of metals, comparision of three statistics M-B, B-E and F-D.

June 2022

Revision of Syllabus

Lesson Plan (2021-2022)

Even Semster
Name - Sushil Kumar
Class - B.sc 3rd (Non medical and Computer science)
Paper- Solid State Physics

Unit - 1

April

Crystal structure: Crystalline and glassy forms, liquid crystal, crystal structure, periodicity, lattice and basis, crystal translations vector and axis. Unit cell and primitive cell, wingers Seitz primitive cell, symmetry operations for two dimensional crystal, Bravais lattice in two and three dimensional. Crystal planes and millers indices, interplaner spacing, crystal structure of zinc sulphide, silicon, sodium chloride and diamond.

Unit -2

Crystal structure: X ray diffraction, Bragg law and experiment Xray diffraction methods. K-space and reciprocal lattice and its physical significance, reciprocal lattice vector, reciprocal lattice to simple cubic lattice and bcc,and fcc.
Lattice vibrations: phonon concept, vibrations of monoatomic and diatomic, Acoustical and optical modes, dispersion relations for phonon, dulong and petits law, Einstein and debye theories of specific heat of solid, debye T3 law

Test and assignments 1

May

Unit -3

Band theory: free electron gas model, nearly free electron model, bloch function, kronig penny model, velocity and effective mass of electron, distinction between metal, semiconductor and insulator ,hall effects.
Magnetic properties of matter: Dia, Para, ferromagnetic material ,classical Langevin theory of Dia and paramagnetic domains, curie law .

Unit 4

Super conductivity: Historical introduction, survey of superconductivity, Super conducting systems, high Tc superconductors, isotopic effects, critical magnetic fields, messiner effects, London theory and penetration depth , classification of superconductors, BCS theory of superconductivity, Flux quantization, Josephson effects Ac and DC, practical applications of superconductors and their limitations.

Test and assignments 2

June

Revisions of syllabus

Name of Teacher : Dr. Manisha Kumar

Class : Bsc 3rd Non Medical and Computer science

Paper : Quantum Mechanics CPL -602

April

Wave function and its physical significance, time dependent and independent schrodinger wave function,Hermitian Opertor,Probability current density and its relation to wave function,Expection values and partical in 1- dimensional box

1st test and assignment

Application of Schrondinger Wave Equation,Free Partical and concept of group velocity,Tunneiing through finite potential barrier, uncertainty principles for position – momentum and energy

May

Larmor Precession, Bohr Magneton,Coupling scheme : LS and JJ coupling scheme, Hyperfine structure of spectral lines and its origin, Atom in external magnetic field; Normal Zeeman effect

Class test and revision of above topics

Rotaional spectra of diatomic molecules as riged rotator,Rotational spectra of diatomic molecules as non rigid rotator,Raman spectra,Molecules as Harmonic oscillator

June Month

Discuss the students problem, Revision of syllabus

Second test and assignment