**Govt. College Dujana (Lesson Plan) Subject: Physics (Even Semesters) 2023-2024**

**Name of the Asst. Professor**: Dr. Monica

**Class --** B.Sc. (Pass Course) 2nd Sem

**Subject** – Properties of Matter,Kinetic Theory and Relativity PHY 201

**Jan.**

Week 1; Week 2 Exams and Practical exams

Week 3 Practical exams

Week 4 Elasticity ,Hooke's law, Elastic constants and their relations

Week 5 Poisson's ratio,torsion of cylinder and twisting couple.

**Feb.**

Week 1 Bending of beam (bending moment and its

magnitude)Cantilevers Numerical Problems.

Week 2 Centrally loaded beam Queries; Assignment

Week 3 Test Unit 1 ;Assumption of kinetic theory of gases

Week 4 Law of equipartition of energy and its application for specific heats of gases

**March**

Week 1 Maxwell distribution of speeds and velocities; Queries.

Week 2 Experimental verification of Maxwell's law of speed distribution:most probable speed average and r.m.s speed

Week 3 Mean free path,transport energy and momentumDiffusion of gases ,Brownian motion,real gases ,vander waal's equation

Week 4 Holi break

**April**

Week 1 Numerical Problems; Assignments and Test Unit II

Week 2 Reference system ,Inetial frames ,Gallilean invariance and conservation laws.Newtonian relativity principle

Week 3 Michelson- Morley experiment,search for ether,lorentz transformations length contraction, time dilation

Week 4 Velocity addition theorem, variation of mass with velocity.

Week 5 Mass energyequivalenceAssignment, Numerical Problems; Test Unit 3

**Name of the Asst. Professor**: Dr. Monica

**Class --** B.Sc. (Pass Course) 2nd Sem

**Subject** – Electronic Devices PHY 202

**Jan.**

Week 1; Week 2 Exams and Practical exams

Week 3 Practical exams

Week 4 Basics of Semiconductors

Week 5 Energy Band in Solids,Intrinsic and Extrinsic

**Feb.**

Week 1 Hall Effect,P-N Junction diode ,V-I characteristics

Week 2 Zener and Avalanche breakdown,Resistance of diode,LED Week 3 Photoconduction,photodiode,Solar cell

Week 4 Rectifiers, Basics of Transistor, Test

**March**

Week 1 Transistor Biasing Methods , DC load line,Amplifiers configuration

Week 2 Classification of amplifier, RC coupled amplifier Queries. Week 4 Feedback in amplifier

Week 3 Numerical Problems; Assignments and Test

Week 4 Holi Break

**April**

Week 1 Basics of Oscillator, Hartley and Colpitt Oscillator Week 2 Growth and decay of current in a RC , RL, LC circuit

Week 3 Growth and decay of current in RLC circuit and Ac analysis of RC, RL, LCcircuit

Week 4 RLC circuit Ac analysis Series Resonance

Week 5 Parallel resonance and Quality factor. Test and queries

**Name of the Asst. Professor**: Dr. Monica

**Class --** B.Sc. (Pass Course) 4th Sem

**Subject** – Statistical Mechanics PHY 401

**Jan.**

Week 1; Week 2 Exams and Practical exams

Week 3 Practical exams

Week 4 Combinations possessing maximum

probability, combinations possessing minimum probability, distribution of molecules in two boxes.

Week 5 Case with weightage (general). Phase space, microstates and macrostates,

**Feb.**

Week 1 Statistical fluctuations constraints and accessible States Thermodynamical probability. Numerical Problems.

Week 2 Queries; Test Unit 1; Postulates of Statistical Physics. Division of Phase space into cells

Week 3 Condition of equilibrium between two system in thermal contact. b Parameter. Entropy and Probability,

Week 4 Boltzman’s distribution law. Evaluation of A and b. Bose-Einstein statistics

**March**

Week 1 Application of B.E. Statistics to Plancks’s radiation law B.E. gas. Queries.

Week 2 Numerical Problems; Assignments and Test Unit II Week 4 Fermi-Dirac statistics,

Week 3 M.B. Law as limiting case of B.E. Degeneracy

Week 4 Holi break

**April**

Week 1 B.E. Condensation. F.D. Gas

Week 2 Electron gas in metals. Zero point energy.

Week 3 Specific heat of metals and its solution. Queries

Week 4 Assignment, Numerical Problems; Test Unit 3

Week 5 Test Unit 1,2,3

**Name of the Asst. Professor**: Dr. Monica

**Class and Semester:** B. Sc. II (Pass Course), Semester : 4

**Name of Subject:** Optics - II PHY - 402

**Jan.**

Week 1; Week 2 Exams and Practical exams

Week 3 Practical exams

Week 4 Introduction Interference

Week 5 Interference by Division of Amplitude Colour of thin, films wedge shaped film

**Feb.**

Week 1 Newton’s rings

Week 2 Interferometers: Michelson’s interferometer

Week 3 Michelson’s interferometer application to (I) Standardisation of a meter (II) determination of wavelength

Week 4 Fresuel’s Diffraction : Fresnel’s half period zones; Zone plate

**March**

Week 1 Diffraction at a straight edge, rectangular slit and circular aperture. Assignment

Week 2 Fraunhoffer diffraction : One slit diffraction, Two slit diffraction N-slit diffraction, Plane transmission grating spectrum

Week 3 Dispersive power of a grating , Limit of resolution, Rayleigh’s criterion, resolving power of

telescope and a grating. Numerical Problems; Assignments and Test

Week 4 Holi break

**April**

Week 1 Polarization :Polarization and Double Refraction : Polarization by reflection, Polarisation by scattering

Week 2 Malus law, Phenomenon of double refraction, Huytgen’s wave theory of double refraction

Week 3 Huytgen’s wave theory of double refraction cont. Analysis of Polarised light : Nicol prism

Week 4 Quarter wave plate and half wave plate, production and detection of (i) Plane polarized light (ii) Circularly polarized light and (iii)Elliptically polarized light

Week 5 Optical activity, Fresnel’s theory of rotation, Specific rotation, Polarimeters

**Name of the Asst. Professor**: Dr. Monica

**Class and Semester:** B. Sc. III (Pass Course), Semester : 6th

**Name of Subject:** Atomic,Molecular and Laser Physics PHY - 601

**Jan.**

Week 1; Week 2 Exams and Practical exams

Week 3 Practical exams

Week 4 Introduction Vector atom model

Week 5 Quantum numbers associated with vector atom model, penetrating and non penetrating orbits**.**

**Feb.**

Week 1 Spectral lines in different series of alkali spectra, spin orbit interaction and doublet term separation LS or Russel-Saunder Coupling.

Week 2 jj coupling (expressions for inteaction energies for LS and jj coupling required). Numerical problems of 1st unit.

Week 3 Zeeman effect (normal and Anormalous) Zeeman pattern of D 1 and D2 lines of Na-atom

Week 4 Paschen Back effect of a single valence electron system. Weak field Stark effect of Hydrogen atom.

**March**

Week 1 Numerical problems and conceptual questions on atoms in the external field. Assignment

Week 2 Discrete set of electronic energies of molecules. quantisation of Vibrational and rotational energies.

Week 3 Raman effect (Quantitative description) Stoke's and anti Stoke's lines. Week 5 Classical and Quantum theory of Raman spectra and selection rules.

Week 4 Holi Break

**April**

Week 1 Numerical Problems; Assignments and Test

Week 2 Main features of a laser : Directionality, high intensity, high degree of coherence, spatial and temporal coherence, Einstein's coefficients.

Week 3 Possibility of amplification, momentum transfer, life time of a level, kinetics of optical absorption.

Week 4 Threshold condition for laser emission, Laser pumping. Numericals

Week 5 He-Ne laser and RUBY laser (Principle, Construction and Working). Applications of laser in the field of medicine and industry.

**Name of the Asst. Professor**: Dr. Monica

**Class --** B.Sc. (Pass Course) 6th Sem

**Subject** – Nuclear Physics PHY- 602

**Jan.**

Week 1; Week 2 Exams and Practical exams

Week 3 Practical exams

Week 4 Introduction Unit I: Nuclear mass and binding energy, nuclear binding energy, nuclear stability, Nuclear size, spin, parity, statistics magnetic

dipole moment, quadrupole moment

Week 5 Determination of mass by Bain-Bridge, Bain-Bride and Jordan mass spectrograph Determination of charge by Mosley law; Determination

of size of nuclei by Rutherford Back Scattering.

**Feb.**

Week1 Test Unit I;Unit II: Interaction of heavy charged particles (Alpha particles), alpha disintegration and its theory

Week2 Energy loss of heavy charged particle (idea of Bethe formula); Energetics of alpha-decay, Range and straggling of alpha particles.

Week 3 Geiger-Nuttal law. Introduction of light charged particle (Beta particle), Origin of continuous beta-spectrum (neutrino hypothesis)

types of beta decay

Week 4 Energetics of beta decay, Energy loss of betaparticles (ionization), Range of electrons, absorption of beta-particles.

Interaction of Gamma Ray, Nature of gamma rays

**March**

Week 1 Energetics of gamma rays, Passage of Gamma radiations through matter photoelectric, Compton effect)

Week 2 Pair production effect; electron position anhilation.

Week 3 Asborption of Gamma rays (Mass attenuation coefficient) and its application. Unit II Test; Nuclear reactions, Elastic scattering, Inelastic scattering, Nuclear disintegration

Week 4 Holi Break

**April**

Week 1 Photonuclear reaction, Radiative capture, Direct reaction, heavy ion reactions and spallatioReactions, conservation laws. Q-value and

reaction threshold.

Week2 Nuclear Reactors General aspects of Reactor design.

Week3 Nuclear fission and fusion reactors

Week4 Linear accelerator, Tendem accelerator, Cyclotron and Betatron accelerators. Ionization chamber

Week 5 Proportional counter, G.M. counter detailed study, scintillation counter and semiconductor detector.