

Government College for Girls, Unhani

Name of Assistant Professor: Dinesh Kumar

Department of Physics

Class and Semester: B.Sc. Semester 2nd

Session:2021-22

Subject:- Kinetic theory of gases, relativity and Electronics

Lesson Plan:(21, March to 15 June 2022)

Week1 (21 to 26 March)

Properties of Matter (Elasticity): Elasticity, Elastic constants and their relations, Poisson's ratio, torsion of cylinder and twisting couple

Week2 (28 to 31 March)

Bending of beam (bending moment and its magnitude) cantilevers, Centrally loaded beam

Week3 (1 to 2 April)

Kinetic Theory of Gases: Assumptions of Kinetic Theory of Gases, Law of equipartition of energy and its applications for specific heats of gases. Maxwell distribution of speeds and velocities (derivation required), Experimental verification of Maxwell's Law of speed distribution

Week4 (4 to 9 April)

most probable speed, average and rms. speed mean free path. Transport of energy and momentum, diffusion of gases. Brownian motion (qualitative), Real gases, Van der Waal's equation.

Week5 (11 to 16 April)

Growth and decay of current in a circuit with (a) Capacitance and resistance (b) resistance and inductance (c) Capacitance and inductance (d) Capacitance resistance and inductance,

Week6 (18 to 23 April)

AC circuit analysis using complex variables with (a) capacitance and resistance, (b) resistance and inductance (c) capacitance and inductance).

Week7 (25 to 30 April)

capacitance, inductance and resistance series and parallel resonant circuit. Quality factor (Sharpness of resonance)

Week8 (2 May to 7 May)

Semiconductor Diodes: Energy bands in solids Intrinsic and extrinsic semiconductor. Hall effect, P-N junction diode and their V-I characteristics Zener and avalanche breakdown. Resistance of a diode

Week9 (9 to 14 May)

Light Emitting diodes (LED). Photo conduction in semiconductors, photodiode, Solar Cell

Diode Rectifiers: P-N junction half wave and full wave rectifier. Types of filter

circuits (L and C with theory). Zener diode as voltage regulator, simple regulated power

Week10 (16 to 21 May)

Transistors: Junction Transistors, Bipolar transistors, working of NPN and PNP transistors, Transistors connections (C-B, C-E, C-C mode), constants of transistor Transistor characteristic curves (excluding h parameter analysis), advantage of C-B configuration. C.R.O. (Principle, construction and working in detail).

Week11 (23 to 28 May) Transistor Amplifiers : Transistor biasing, methods of Transistor biasing and

stabilization. DC. load line. Common-base and common-emitter transistor biasing Common-base, common-emitter amplifiers

Week12 (30 to 31May) Resistance capacitance (R-C) coupled amplifier (two stage; concept of band width, no derivation). Feed-back in amplifiers advantage of negative feedback Emitter follower.

Week13 (1 to 4 June)

Oscillators: Oscillators, Principle of oscillation, Classification of Oscillators, Condition of self sustained oscillation Barkhausen Criterion for oscillation. Tuned collector common emitter oscillator Hartley oscillator Colpitt's oscillator

Week14 (6 to 11 June)Reference systems, inertial frames, Gallilean invariance and

Conservation laws, Newtonian relativity principle, Michelson-Morely experiment: search for ether. Lorentz transformations length contraction, time dilation, velocity addition theorem, variation of mass with velocity and mass energy equivalence.

Week15 (13 to onwards)

Revision & Class Test

Government College for Girls, Unhani

Name of Assistant Professor: Dinesh Kumar

Department of Physics

Class and Semester: B.Sc. Semester 4th

Session:2021-22

Subject:- Statistical Mechanics and Optics

Week1 (21 to 26 March)Probability concepts with examples

Week2 (28 to 31 March)

Thermo dynamical Probability, Phase cells, b - Parameter

Week3 (1 to 2 April)

Entropy and Probability, Boltzmann's distribution law. Evaluation of A and b. Bose-Einstein statistics

Week4 (4 to 9 April)

B.E. Statics, Plank's Law, B.E. Gas

Week5 (11 to 16 April)B.E. Condensation, Fermi Gas, Specific heat of metals

Week6 (18 to 23 April)-Interference by amplitude and wave front division, colour in thin films, Newton's Ring,

Week7 (25 to 30 April)Interferometers: Michelson's interferometer

Week8 (2 May to 7 May)

-Standardisation of a meter (II) determination of wave length. Fresnel's Diffraction: Fresnel's half period zones, zone plate

Week9 (9 to 14 May)

-diffraction at a straight edge, rectangular slit and circular aperture

Week10 (16 to 21 May)

Fraunhofer diffraction: One slit diffraction, Two slit diffraction N-slit diffraction

Week11 (23 to 28 May)

Plane transmission grating spectrum, Dispersive power of a grating, Limit of resolution, Rayleigh's criterion, resolving power of telescope and a grating.

Week12 (30 to 31May)

Polarization and Double Refraction: Polarization by reflection Polarization by scattering. Malus law, Phenomenon of double refraction,

Week13 (1 to 4 June) Huygens's wave theory of double refraction (Normal and oblique incidence),.

Analysis of Polarized light: Nicol prism, Quarter wave plate and half wave plate, production and detection of (1) Plane polarized light (ii) Circularly polarized light and (iii) Elliptically polarized light.

Week14 (6 to 11 June)

Optical activity, Fresnel's theory of rotation, Specific rotation, Polari-meters (half shade and Bi-quartz)

Week15 (13 to onwards)

Test of the chapter and presentation.

Government College for Girls, Unhani

Name of Assistant Professor: Dinesh Kumar

Department of Physics

Class and Semester: B.Sc. Semester 6

Session: 2021-22

Subject:- Spectroscopy and Laser and Nuclear Physics

Week1 (21 to 26 March)

Vector atom model, quantum numbers, penetrating and non-penetrating orbits

Week2 (28 to 31 March)

Alkali spectra, spin orbit interaction and doublet term separation

Week3 (1 to 2 April)

.jj coupling , Expression for Energy

Week4 (4 to 9 April)

Zeeman effect (normal and Anormalous), Zeeman pattern of D, and D lines of Na-atom

Week5 (11 to 16 April)

Paschen -Back effect of a single valence electron system

Week6 (18 to 23 April)

Weak field Stark effect of Hydrogen atom.

electronic ,Vibrational and rotational energy of molecules, Raman effect

Week7 (25 to 30 April)

Nuclear mass and binding energy, nuclear stability

Nuclear size, spin, parity, statistics magnetic dipole moment, quadrupole moment

<p>Week8 (2 May to 7 May)</p> <p>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</p>
<p>Week9 (9 to 14 May)</p> <p>Interaction of heavy charged particles (Alpha particles), alpha disintegration and its theory Energy loss of heavy charged particle , Energetic of alpha-decay, Range and straggling of alpha particles, Geiger-Nuttal law.</p>
<p>Week10 (16 to 21 May)</p> <p>Beta-particles, Origin of continuous beta-spectrum (neutrino hypothesis), types of beta decay and energetic of beta decay, Energy loss of beta-particles (ionization), Range of electrons, absorption of beta-particles. Nuclear reactions, Elastic scattering, Inelastic scattng, Nuclear disintegration, photonuclear reaction, Radioactive capture</p>
<p>Week11 (23 to 28 May) Direct reaction, heavy ion reactions and spallation Reactions, conservation laws. Q-value and reaction threshold. Nuclear Reactors, General aspects of Reactor design. Nuclear fission and fusion reactors,</p>
<p>Week12 (30 to 31May) Linear accelerator, Tandem accelerator, Cyclotron and Betatron accelerators. Ionization chamber, proportional counter, G.M. counter detailed study, scintillation counter and semiconductor detector.</p>
<p>Week13 (1 to 4 June)</p> <p>Main features of a laser: Directionality, high intensity, high degree of coherence, spatial and temporal coherence, Einstein's coefficients and possibility of amplification, momentum transfer, life time of a level, kinetics of optical absorption. Threshold condition for laser emission</p>
<p>Week14 (6 to 11 June)</p> <p>Laser pumping, He-Ne laser and RUBY laser (Principle, Construction and Working). Applications of laser in the field of medicine and industry</p>
<p>Week15 (13 to onwards)</p> <p>Test of the chapter and presentation.</p>