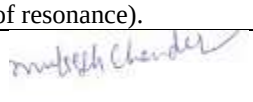
Summary of lesson plans of Govt college Faculty for Academic Session 2021-22

GOVT COLLEGE ISRANA

Name of Assist. Prof. **Dr Mukesh Chander**

Class **BSc I Sem 1st** **Sub. Physics**

Date	Topic Covered Paper 1
Oct. 2021 to Nov. 2021	Mechanics of single and system of particles, Conversion law of linear momentum, Angular momentum and mechanical energy for a particle and a system of particles, Centre of Mass and equation of motion, Constrained Motion.
	Degrees of freedom and Generalized coordinates, Transformation equations, Generalized Displacement, Velocity, Acceleration, Momentum, Force and Potential, Hamilton's variational principle,
	Lagrange's equation of motion from Hamilton's principle, Linear Harmonic oscillator, Simple pendulum, Atwood's machine.
	Frame of reference, limitation of Newton's law of motion, Inertial frame of reference, Galilean transformation, Frame of reference with linear acceleration, Classical relativity- Galilean invariance
Nov. 2021	Transformation equation for a frame of reference- inclined to an inertial frame and Rotating frame of reference, Non-inertial frames-The accelerated frame of reference and rotating frame of reference , Effect of centrifugal and coriolis forces due to Earth's rotation, Fundamental frame of reference,
	Special theory of relativity, Lorentz co-ordinate and physical significance of Lorentz invariance, Length Contraction, Time Dilation, Twin Paradox, Velocity addition theorem, Variation of mass with velocity
	Mass energy equivalence, Transformation of relativistic momentum and energy, relation between relativistic momentum and energy, Mass, velocity, momentum and energy of zero rest mass.
Date	**Topic Covered Paper 2**
Dec 2021	Gradient of a scalar and its physical significance, Line, Surface and Volume integrals of a vector and their physical significance, Flux of a vector field, Divergence and curl of a vector and their physical significance, Gauss's divergence theorem
	Stoke's theorem, Derivation of electric field E from potential as gradient, Derivation of Laplace and Poisson equations, Electric flux, Gauss's Law, Mechanical force of charged surface, Energy per unit volume.
	Magnetic induction, Magnetic flux, Solenoidal nature of vector field of induction, properties of (i) , (ii) , Electronic theory of dia and paramagnetism, Domain theory of ferromagnetism (Langevin's theory), Cycle of magnetization- hystresis loop (Energy dissipation, Hystresis loss and importance of Hystresis Curve)
Jan 2022	Maxwell equations and their derivations, Displacement current, Vector and Scalar potentials, Boundary conditions at interface between two different media, Propagation of electromagnetic wave (Basic idea, no derivation), Poynting vector and Poynting theorem
	A.C. circuit analysis using complex variable with (a) Capacitance and Resistance (CR) (b) Resistance and Inductance (LR) (c) Capacitance and Inductance (LC) and (d) Capacitance, Inductance and Resistance (LCR), Series and parallel resonance circuit, Quality factor (sharpness of resonance).



Dr Mukesh Chander

Summary of lesson plans of Govt college Faculty for Academic Session 2021-2022

GOVT COLLEGE ISRANA

Name of Extension Lect. Dr Mukesh Chander

Class BSc 3rd Sem Sub. Physics

Date	Topic Covered
Oct. 2021	Computer organization, Binary representation, Algorithm development, Flow charts and their interpretation. FORTRAN Preliminaries: Integer and floating point arithmetic expression, built in functions, executable and non-executable statements,
	Input and output statements, Formats, IF, DO and GO TO statements, Dimension arrays, statement function and function subprogram.
	Algorithm, Flow Chart and Programming for Print out of natural numbers, Range of the set of given numbers, Ascending and descending order, Mean and standard deviation, Least square fitting of curve, Roots of quadratic equation, Product of two matrices, Numerical integration (Trapezoidal rule and Simpson 1/3 rule) .
Nov. 2021	Thermodynamic system and Zeroth law of thermodynamics. First law of thermodynamics and its limitations, reversible and irreversible process. Second law of thermodynamics and its significance, Carnot theorem, Absolute scale of temperature, Absolute Zero and magnitude of each division on work scale and perfect gas scale
	Joule's free expansion, Joule Thomson effect, Joule-Thomson (Porous plug) experiment, conclusions and explanation, analytical treatment of Joule Thomson effect. Entropy, calculations of entropy of reversible and irreversible process ,
	T-S diagram, entropy of a perfect gas, Nernst heat law(third law of thermodynamics), Liquefaction of gases, (oxygen, air, hydrogen and helium), Solidification of He below 4K, Cooling by adiabatic demagnetization.
	Derivation of Clausius-Clapeyron and Clausius latent heat equation and their significance,specific heat of saturated vapours,phase diagrame and triple point of a substance, development of Maxwell thermodynamical relations. Thermodynamical functions: Internal energy (U), Helmholtz function (F), Enthalpy (H), Gibbs function (G)and the relations between them.
Jan 2021	derivation of Maxwell thermodynamical relations from thermodynamical functions,Application of Maxwell relations: relations between two specific heats of gas, Derivation of Clausius-Clapeyron and Clausius equation,variation of intrinsic energy with volume for (i) perfect gas (ii)Vanderwall gas (iii)solids and liquids , derivation of Stefans law, adiabatic compression and expention of gas & deduction of theory of Joule Thomson effect.
Date	**Topic Covered Paper 2**
Dec 2021	Interference by Division of Wave front: Young's double slit experiment, Coherence, Conditions of interference, Fresnel's biprism and its applications to determine the wavelength of sodium light and thickness of a mica sheet, Lloyd's mirror, Difference between Bi-prism and Llyod mirror fringes, phase change on reflection.
	Interference by Division of Amplitude: Plane parallel thin film, production of colors in thin films, classification of fringes in films, Interference due to transmitted light and reflected light, wedge shaped film, Newton's rings, Interferometer: Michelson's interferometer and its applications to (i) Standardization of a meter (ii) determination of wavelength.
Jan 2021	Fresnel's diffraction: Fresnel's assumptions and half period zones, rectilinear propagation of light, zone plate, diffraction at a straight edge, rectangular slit and circular aperture, diffraction due to a narrow slit and wire.
	Fraunhoffer diffraction: single-slit diffraction, double-slit diffraction, N-slit diffraction, plane transmission granting spectrum, dispersive power of grating, limit of resolution, Rayleigh's criterion, resolving power of telescope and a grating. Differences between prism and grating spectra.

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Summary of lesson plans of Govt college Faculty for Academic Session 2021-22

GOVT COLLEGE ISRANA

Name of Extension Lect. Dr Mukesh Chander

Class BSc Sem 5th Sub. Physics

Date	Topic Covered Paper 1
Oct. 2021	Overview, scale of quantum physics, boundary between classical and quantum phenomena, Photon, Photoelectric effect, Compton effect (theory and result), Frank-Hertz experiment, de-Broglie hypothesis. Davisson and Germer experiment
	G.P.Thomson experiment. Phase velocity, group velocity and their relation. Heisenberg's uncertainty principle. Time energy and angular momentum, position uncertainty. Uncertainty principle from de Broglie wave. (Wave-particle duality). Gamma Ray Microscope, Electron diffraction from a slit
	. Derivation of 1-D time-dependent Schrodinger wave equation (subject to force, free particle). Time-independent Schrodinger wave equation, eigen values, eigen functions, wave functions and its significance. Orthogonality and Normalization of function, concept of observer and operator. Expectation values of dynamical quantities, probability current density.
	Free particle in one-dimensional box (solution of Schrodinger wave equation, eigen functions, eigen values, quantization of energy and momentum, nodes and anti nodes, zero point energy). One dimensional step potential E > Vo (Reflection and Transmission coefficient) One dimensional step potential E < Vo (penetration depth calculation).
Nov. 2021	One dimensional potential barrier, E > Vo (Reflection and Transmission coefficient) One-dimensional potential barrier, E < Vo (penetration or tunneling coefficient). Solution of Schrodinger equation for harmonic oscillator (quantization of energy, Zero-point energy, wave equation for ground state and excited states).
	Absorption and emission of radiation, 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 ((two and three level rate equation, Fuchbauer landerburg formula).population inversion: A necessary condition for light amplification, resonance cavity, laser pumping, Threshold condition for laser emission, line broadening mechanism, homogeneous and inhomogeneous line broadening (natural, collision and Doppler broadening).
	He-Ne laser and RUBY laser (Principle, Construction and working), Optical properties of semiconductor, Semiconductor laser (Principle, Construction and working), Applications of lasers in the field of medicine and industry.
Date	**Topic Covered Paper 2**
Dec 2021	Nuclear composition (p-e and p-n hypotheses), Nuclear properties; Nuclear size, spin, parity, statistics, magnetic dipole moment, quadruple moment (shape concept). Determination of mass by Bain-Bridge, Bain-Bridge and Jordan mass spectrograph.
	Determination of charge by Mosley Law. Determination of size of nuclei by Rutherford Back Scattering. mass and binding energy, systematic of nuclear binding energy, nuclear stability
	Alpha-disintegration and its theory. Energetics of alpha-decay, Origin of continuous beta spectrum (neutrino hypothesis), types of beta-decay and energetics of beta-decay. Nature of gamma rays, Energetics of gamma rays.
	Interaction of heavy charged particles (Alpha particles); Energy loss of heavy charged particle (idea of Bethe formula, no derivation), Range and straggling of alpha particles. Geiger-Nuttal law. Interaction of light charged particle (Beta-particle), Energy loss of beta-particles (ionization), Range of electrons, absorption of beta-particles.
Jan 2021	Interaction of Gamma Ray; Passage of Gamma radiations through matter (Photoelectric, Compton and pair production effect) electron-positron annihilation. Absorption of Gamma rays (Mass attenuation coefficient) and its application.
	Linear accelerator, Tendem accelerator, Cyclotron and Betatron accelerators. Gas filled counters; Ionization chamber, proportional counter, G.M. Counter (detailed study), Scintillation counter and semiconductor detector.
	Nuclear reactions, Elastic scattering, Inelastic scattering, Nuclear disintegration, Photonuclear reaction, Radiative capture, 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,(Principle, construction, working and use).

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