Name of Assistant Prof.: Ms. Aashi Mittal Class: B.Sc (1stSemester)

Subject : Classical Mechanics and Theory of Relativity

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| **Month-2021** | **Week** | **Units/Topics Covered** |
| October-2021 | Week 1 | **Unit-1( Basic concepts of Classical Mechanics)**  Mechanics of single and system of particles ,conservation laws of linear momentum ,angular momentum and energy for a single particle |
| Week 2 | conservation laws of linear momentum ,angular momentum and energy for a system of particles |
| Week 3 | Centre of mass and equation of motion ,constraints and type of constraints and related problems,Discussion of related problems |
| Week 4 | **Unit-2(Generalised Notations)**  Generalised coordinates (introduction),degree of freedom,generaliseddisplacement,velocity ,acceleration, |
| November-2021 | Week 1 | Generalisedmomentum,force and potential, Phase space,hamilton’svariational principle |
| Week 2 | langrange equation of motion from Hamilton principle, Applications of hamilton’svariational principle –linear harmonic oscillator,simple pendulum ,atwood machine |
| Week 3 | Discussion and test of unit-1  Unit-3( Theory of Relativity)  Reference system,inertial and non inertial frames |
| Week 4 | Galilean transformation, Frame of reference with linear acceleration, |
| December-2021 | Week 1 | Transformation equation for a frame of reference- inclined to an inertial frame and Rotating frame of reference,Non-inertial frames-The acceleratedframe  of reference and rotating frame of reference |
| Week 2 | Effect of centrifugal and coriolis forces due  to Earth’s rotation, Fundamental frame of reference, Michelson- Morley’s experiment,  concept of Einstein’s relativity. |
| Week 3 | UNIT 4-**Applications of theory of relativity**  Special theory of relativity, Lorentz co-ordinate and physical significance of Lorentzinvariance, Length Contraction, Time Dilation,Twin Paradox, |
| Week 4 | Velocity additiontheorem, Variation of mass with velocity,  Mass energy equivalence, Transformation of  relativistic momentum and energy, relation between relativistic momentum and energy and assignment of unit-3 |

Name of the Assistant Professor :- Ms. Ankita

Class :-B.Sc. 1st Semester Computer science and Non Medical

Subject: - PHYSICS (Electricity & Magnetism)

OCTOBER. 2021

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| Week | Topics |
| 1 | **Unit 1: Vector background and Electric field**  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. |
| 2 | Divergence and curl of a vector and their physical significance, Gauss’s divergence theorem, Stoke’s theorem. |
| 3 | Derivation of electric field E from potential as gradient,Derivation of Laplace and poisson equations, Electric flux,  Curve) |
| 4 | Gauss’s law, Mechanical force of charged surface, Energy per unit volume.  **Unit 2: Magnetism**  Magnetic induction, Magnetic flux. |
| 5 | Solenoidal nature of vector field of induction, properties of BVector and Scalarpotentials. |

NOVEMBER 2021

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| Week | Topics |
| 1 | Electronic theory of dia and paramagnetism,Domain theory of ferromagnetism (Langevin’s theory) . |
| 2 | Cycle of magnetization- hystresis loop ( Energy dissipation, Hystresis loss and importance of Hystresis Curve)  UNIT-3 Electromagnetism  Maxwell equations and their derivations, Displacement current, Vector and Scalar potentials. |
| 3 | Boundary conditions at interface between two different media ) Propagation of electromagnetic wave (Basic idea, no derivation). |
| 4 | Poynting vector and Poynting theorem. Unit test 3 |

**DECEMBER 2021**

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| Week | Topics |
| 1  2  3 | Test of unit 3, assignment,  UNIT 4: AC Analysis  A.C. circuit analysis using complex variable with (a) Capacitance and Resistance(CS)  b) Resistance and Inductance (LR) (c) Capacitance and Inductance (LC)  and (d) Capacitance, Inductance and Resistance (LCR)  Series and parallel resonance circuit, Quality factor (sharpnessof resonance). |

**B.Sc.-II(Physics)**

**Semester-III**

**Physics- PH-301**

**Paper V: Computer Programming and Thermodynamics**

**Session 2021-22**

**Oct. 1stWeek (4-9th Oct. 2021)**

**UNIT-1:** Computer Programming

Computer organization, Binary representation, Algorithm development, Flow charts andtheir interpretation. FORTRAN Preliminaries: Integer and floating point arithmeticexpression

**Oct. 2ndweek (11-16th Oct. 2021)**

Built in functions, executable and non-executable statements, input and outputstatements, Formats, IF, DO statements.

**Oct. 3rdweek (18-23rd Oct. 2021)**

GO TO statements, Dimension arrays, statementfunction and function subprogram.

**Oct. 4th week (25-30th Oct. 2021)**

**UNIT –2:** Applications of FORTRAN programmingAlgorithm, Flow Chart and Programming for Print out of natural numbers, Range of theset of given numbers, Ascending and descending order.

**Nov. 1st week (1-6th Nov. 2021)**

Mean and standard deviation, least square fitting of curve, Roots of quadratic equation, Product of two matrices,

**Nov. 2nd week (8-13th Nov. 2021)**

Numerical integration (Trapezoidal rule and Simpson 1/3 rule).

**UNIT-3:** Thermodynamics-I

Thermodynamic system and Zeroth law of thermodynamics. First law of thermodynamics

and its limitations, reversible and irreversible process.

**Nov. 3rdweek (15-20th Nov. 2021)**

Second law of thermodynamicsand its significance, Carnot theorem, Absolute scale of temperature, Absolute Zero andmagnitude of each division on work scale and perfect gas scale, Joule’s free expansion, Joule Thomson effect.

**Nov. 4thweek (22-27thNov. 2021)**

Joule-Thomson (Porous plug) experiment, conclusions andexplanation, analytical treatment of Joule Thomson effect. Entropy, calculations ofentropy of reversible and irreversible process, T-S diagram, entropy of a perfect gas.

**Dec. 1st week (29-30 Nov, 1-4th Dec. 2021)**

Nernst heat law(third law of thermodynamics), Liquefaction of gases, (oxygen, air,hydrogen and helium), Solidification of He below 4K, Cooling by adiabaticdemagnetization.

**Dec. 2nd week (6-11 Dec. 2021)**

**UNIT-4:** Thermodynamics-II

Derivation of Clausius-Clapeyron and Clausius latent heat equation and theirsignificance,specific heat of saturated vapours,phase diagram and triple point of a Substance.

**Dec. 3rd week (13-18th Dec. 2021)**

Development of Maxwell thermodynamical relations. Thermodynamicalfunctions: Internal energy (U), Helmholtz function (F), Enthalpy (H), Gibbs function (G)and the relations between them, derivation of Maxwell thermodynamical relations fromthermodynamical functions,Application of Maxwell relations: relations between twospecific heats of gas.

**Dec. 4th week (20-25th Dec. 2021)**

Derivation of Clausius-Clapeyron and Clausius equation,variationof intrinsic energy with volume for (i) perfect gas (ii)Vanderwall gas (iii)solids andliquids , derivation of Stefans law, adiabatic compression and expansion of gas &deduction of theory of Joule Thomson effect.

**Lesson Plan (WAVES AND OPTICS)**

Name of the Assistant Professor: Dr. Ramesh Kumar, 2021-22

Class and Section:-B.Sc 3rd SEMESTER (Non-Medical and Computer Science)

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| Month | WEEK | TOPICS |
| October |  | Introduction to Optics |
|  |  | Introduction to interference and Diffraction of light |
|  |  | UNIT-1 Interference by Division of Wave front: Young’s double slit experiment, Coherence, Conditions of interference |
|  |  | Fresnel biprism and its applications to determine the  wavelength of sodium light and thickness of a mica sheet, |
| November |  | Lloyd's mirror, Difference between Bi-prism and Llyod mirror fringes, Stokes relation& numerical |
|  |  | UNIT-2 Interference by Division of Amplitude: Plane parallel thin film, |
|  |  | production of colors in thin films, non reflecting film, wedge shape thin film, classification of fringes in films, |
|  |  | Interference due to transmitted light and  reflected light, Newton's rings experiment and its application( UNIT TEST) |
| December |  | Interferometer: Michelson's interferometer and its applications to (i) Standardization of a meter  (ii) Determination of wavelength. |
|  |  | Unit-4 Diffraction and its types, Fraunhoffer diffraction: single-slit diffraction, double-slit diffraction |
|  |  | N-slit diffraction, plane transmission granting spectrum, dispersive power of grating, limit of resolution  UnitTest |
|  |  | Rayleigh's criterion, resolving power of telescope and a grating. Differences between prism and grating spectra |
| January |  | Unit-3Fresnel’s diffraction: Fresnel’s assumptions and half period zones, rectilinear propagation of light, zone plate, |
|  |  | 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, wire, numerical, Unit Test |
|  |  | Revision |

Name of Assistant Prof. : Dr. Manoj Kumar

Class : B.Sc. (NM) Vth Sem& B.Sc. (CS) Vth Sem

Subject : Physics

Paper- : Quantum and Laser Physics

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|  | **Week** | **Topics Covered** |
| Oct-2021 | Week 1 | Need for Quantum Mechanics, Frank- Hertz experiment, de-Broglie hypothesis. Davisson and Germer experiment |
| Week 2 | G.P. Thomson experiment. Phase velocity, group velocity and their relation. Heisenberg's uncertainty principle. |
| Week 3 | Time energy and angular momentum, position uncertainty.  Uncertainty principle from de Broglie wave. (Wave-particle duality). Gamma Ray Microscope. |
| Week 4 | 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 |
| Nov-2021 | Week 1 | 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). |
|  | Week 2 | One dimensional step potential, One dimensional potential barrier |
|  | Week 3 | Solution of Schrodinger equation for harmonic oscillator (quantization of energy, Zero-point energy, wave equation for ground state and excited states). |
|  | Week 4 | 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, Fuchbauerlanderburg formula).population inversion: |
| Dec- 2021 | Week 1 | 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). |
|  | Week 2 | 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. Detector |

Name of Assistant Prof. : Dr. Manju Sharma Class: B.Sc (5th Semester)

Subject : Nuclear Physics

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| **Month-2021** | **Week** | **Units/Topics Covered** |
| October-2021 | Week 1 | **Unit-1 (Nuclear Structure and properties of nuclei)**  History of Nuclear Physics, Models of atom; Thomson model, Rutherford model, Alpha ray scattering experiment, The Observations and Results, Determination of size of nucleus by Rutherford Back Scattering, Limitations. |
| Week 2 | Nuclear hypothesis, Nuclear composition, mass and binding energy Systematic of nuclear binding energy, Average binding energy, mass defect, Numericals on Binding energy, Tutorial. Nuclear stability, Nuclear Size |
| Week 3 | Spin, Parity, Statistics, Magnetic Dipole Moment, Quadrupole Moment, Determination of mass by Bain-Bridge, Bain-Bridge and Jordan mass Spectrograph, Numericals |
| Week 4 | Origin of X-rays, Continuous and characteristics X-ray Spectra, Determination of charge by Mosley Law, Tutorial |
| November-2021 | Week 1 | **Unit-4 (Nuclear Reactions)**  Nuclear Reactions, Elastic Scattering, Inelastic Scattering, Nuclear Disintegration, Photonuclear Reactions, Radiative Capture, Direct Reactions, Heavy Ion Reactions and Spallation Reactions, Conservation Laws, Q-Value and Reaction Threshold, |
| Week 2 | Nuclear Fission, Nuclear Reactors, General Aspects of Reactor Design, Nuclear fission Reactor (Principle, Construction, working and use), Nuclear Fusion Reactors (Principle, Construction, working and use)**,** Numericals on Q-value and Threshold energy |
| Week 3 | **Unit-3(Nuclear Accelerators)**  Linear accelerator, Tendom accelerator, Cyclotron and Betatron accelerators |
| Week 4 | Gas Filled counters; Ionization chamber, Proportional Counter |
| December-2021 | Week 1 | G.M. Counter, Scintillation Counter and Semiconductor Detector |
| Week 2 | **Unit-2** (**Nuclear Radiation decay Processes),** Origin of continuous beta spectrum (neutrino hypothesis), Types of beta decay, Energetic of beta decay, Alpha disintegration and its theory, Energetic of Alpha Decay |
| Week 3 | Interaction of heavy charged particles (Alpha particles), Energy loss of heavy charged particles (Bethe Formula) |
| Week 4 | Nature of gamma rays, energetics of gamma rays |