Lesson Plan

Name and designation of teacher : Dr. Rajanish Saikia
Assistant Professor, Department of Physics

Course : B. Sc. (Core and General Elective)

Programme : Undergraduate

Paper code : C2, C4, C7, C10, C12, DSE3, GE4

Class allotted (per week) : 19

Paper /unit	**Course Content**	**Topic of discussion**	**Teaching methods**	**Assessment method**	**Learning outcome**	**No. of classes**
C2	Mechanics (Theory and Lab)	1. Gravitation and Central Force Motion 2. Simple Harmonic Oscillations. Differential equation of SHM and its solution 3. Non-Inertial Systems 4. Coriolis force and its applications 5. Special Theory of Relativity 6. Relativistic Kinematics. Transformation of Energy and Momentum	Power-point presentation, chalk-board and ICT tools	Assignment, Seminar, performance & regularity in laboratory and Sessional examination	1. Enable to understand simple harmonic oscillator as it is a unique mechanical problem and will help them to understand the advanced treatment in quantum mechanics and modern Physics. 2. Develop knowledge of special relativity to understand relativistic formulation of modern theories. 3. Develop knowledge of mechanics which will help students in their everyday life.	30(theory) + 24(Lab)

Paper /unit	Course Content	Topic of discussion	Teaching methods	Assessment method	Learning outcome	No. of classes
C4	Waves And Optics (Theory and Lab)	1. Huygens principle. Temporal and Spatial coherence 2. Interference: Division of amplitude and wave front 3. Lloyd's Mirror and Fresnel's Biprism. 4. Newton's Rings: Measurement of wavelength and refractive index. 5. Interferometer: Michelson Interferometer and Fabry-Perot interferometer 6. Kirchhoff's Integral Theorem, Fresnel-Kirchhoff's Integral formula 7. Diffraction: Fraunhofer diffraction and Fresnel 8. Diffraction grating. Resolving power of grating 9. Fresnel's half-Period Zones for Plane Wave. Explanation of Rectilinear Propagation of Light. Theory of a Zone Plate	Power-point presentation, chalk-board and ICT tools	Assignment, Seminar, performance & regularity in laboratory and Sessional examination	1. Enable the students to analyze different phenomena due to the interaction of light with light and matter. 2. Train the students to use different optical instruments. 3. Help the students to understand various natural phenomena using different apparatus in the laboratory.	33(theory) + 24(Lab)

Paper /unit	Course Content	Topic of discussion	Teaching methods	Assessment method	Learning outcome	No. of classes
C7	Digital Systems And Applications (Theory and Lab)	1. Introduction to CRO. 2. Applications of CRO: (1) Study of Waveform, (2) Measurement of Voltage, Current, Frequency, and Phase Difference. 3. Integrated Circuits: Advantages and drawbacks 4. Scale of integration and classification 5. Difference between Analog and Digital Circuits 6. Number System 7. AND, OR and NOT Gates and universal gates 8. Boolean algebra 9. Data processing circuits 10. Binary Addition. Binary Subtraction using 2's Complement. Half and Full Adders. Half & Full Subtractors 11. Sequential Circuits 12. IC 555: block diagram and applications 13. Shift registers 14. Counters (4 bits) 15. Computer Organization 16. Intel 8085 Microprocessor Architecture: 17. Introduction to Assembly Language	Power-point presentation, chalk-board and ICT tools	Assignment, Seminar, performance & regularity in laboratory and Sessional examination	1. Identify and understand digital electronic principles and systems. 2. Apply the knowledge to analyze and apply digital circuits in solving circuit level problems. 3. Build real life applications using digital systems.	60(theory) + 30(Lab)

Paper /unit	Course Content	Topic of discussion	Teaching methods	Assessment method	Learning outcome	No. of classes
C10	Analog Systems And Applications (Theory and Lab)	1. Semiconductor Diodes 2. PN Junction Diode. Current Flow Mechanism in Forward and Reverse Biased Diode 3. Rectifier Diode: Half-wave Rectifiers. Centre-tapped and Bridge Full-wave Rectifiers 4. Zener Diode and Voltage Regulation 5. Principle and structure of (1) LEDs, (2) Photodiode and (3) Solar Cell 6. Bipolar Junction transistors: Characteristics of CB, CE and CC Configurations 7. Amplifiers and classification 8. Two stage RC coupled Amplifier and its frequency response 9. Feedback in Amplifiers 10. Sinusoidal Oscillators 11. Characteristics of an Ideal and Practical Op-Amp. (IC 741) Open-loop and Closed-loop Gain. 12. Applications of Op-Amps: 13. Resistive network Accuracy and Resolution. A/D Conversion.	Power-point presentation, chalk-board and ICT tools	Assignment, Seminar, performance & regularity in laboratory and Sessional examination	1. The students will enable to learn the foundation knowledge of analog electronic systems. 2. Learn the working and applications of PN junction and bipolar junction transistors (BJT). 3. Learn to analyze circuits containing PN junction and BJT along with the application of BJT as amplifiers and oscillators. 4. Develop basic knowledge of operational amplifier and its applications	60(theory) + 30(Lab)

Paper /unit	Course Content	Topic of discussion	Teaching methods	Assessment method	Learning outcome	No. of classes
C12	Solid State Physics (Theory and Lab)	1. Crystal Structure: lattice with a Basis – Central and Non-Central Elements. Unit Cell, Reciprocal Lattice 2. Diffraction of X-rays by Crystals. Bragg's Law 3. Lattice Vibrations and Phonons: Acoustical and Optical Phonons. 4. Dulong and Petit's Law, Einstein and Debye theories of specific heat of solids. T3 law 5. Magnetic Properties of Matter 6. Polarization, Electric Susceptibility. Polarizability. 7. Clausius Mosotti Equation 8. Normal and Anomalous Dispersion. Cauchy and Sellmeir relations. Langevin-Debye equation 9. Ferroelectric Properties of Materials 10. Kronig Penny model. Band Gap. Conductor, Semiconductor (P and N type) and insulator. 11. Hall Effect. 12. Superconductivity: Meissner effect. Type I and type II Superconductors, London's Equation	Power-point presentation, chalk-board and ICT tools	Assignment, Seminar, performance & regularity in laboratory and Sessional examination	1. Student will enable to equip the basic concepts of solid state Physics so that the knowledge can be applied for further development of the subject. 2. Enable a student to work in both theoretical and experimental aspects of solid state Physics. 3. Help the students in thorough learning of the concepts associated to the course through the laboratory experiments.	60(theory) + 30(Lab)

Paper /unit	Course Content	Topic of discussion	Teaching methods	Assessment method	Learning outcome	No. of classes
DSE 3	Nuclear And Particle Physics (Theory)	1. General Properties of Nuclei 2. Binding energy and its variation with mass number 3. Angular momentum, parity, magnetic moment, electric moments, nuclear excites states 4. Nuclear Models: Liquid drop model approach, semi empirical mass formula and shell model 5. Radioactivity decay: alpha, beta decay and Gamma decay 6. Types of Nuclear Reactions 7. Coulomb scattering. 8. Interaction of Nuclear Radiation with matter: Bethe-Block formula, Cerenkov radiation. Gamma ray interaction through matter, photoelectric effect, Compton scattering, pair production, neutron interaction with matter 9. Detector for Nuclear Radiations 10. Particle Accelerators 11. Particle Physics	Power-point presentation, chalk-board and ICT tools	Assignment, Seminar, performance & regularity in laboratory and Sessional examination	1. The students will enable to develop knowledge regarding nuclear and elementary particle as well as properties and phenomena related to them. 2. Successfully apply the same knowledge in solving problems in the field of nuclear and particle Physics.	80(theory)

Paper /unit	Course Content	Topic of discussion	Teaching methods	Assessment method	Learning outcome	No. of classes
GE4	Waves And Optics (Theory and Lab)	1. Electromagnetic nature of light. Definition and Properties of wave front. Huygens Principle 2. Interference: Division of amplitude and division of wavefront 3. Michelson's Interferometer: 4. Diffraction: Fraunhofer diffraction and Fresnel Diffraction 5. Polarization	Power-point presentation, chalk-board and ICT tools	Assignment, Seminar, performance & regularity in laboratory and Sessional examination	1. Student will be able to learn the basic ideas of the behavior of light based on its wave nature. 2. Justify different phenomena due to light and the interaction of light among them and with matter. 3. Use different optical instruments	37(theory) + 14(Lab)

Lesson Plan

Name and designation of teacher : Mr. Swagatam Deva Nath
Assistant Professor, Department of Physics

Course : B. Sc. (Core and General Elective)

Programme : Undergraduate

Paper code : C2, C3, C9, C11, DSE4, GE1, GE2

Class allotted (per week) : 20

Paper /unit	**Course Content**	**Topic of discussion**	**Teaching methods**	**Assessment method**	**Learning outcome**	**No. of classes**
C2	Mechanics (Theory and Lab)	1. Reference frames. Inertial frames; Review of Newton's Laws of Motion. Galilean transformations; Galilean invariance 2. Motion of rocket. Motion of a projectile in Uniform gravitational field Dynamics of a system of particles 3. Principle of conservation of momentum 4. Work and Kinetic Energy Theorem 5. Conservative and non-conservative forces 6. Elastic and inelastic collisions between particles 7. Rotational Dynamics 8. Elasticity 9. Poiseuille's Equation for Flow of a Liquid through a Capillary Tube	Power-point presentation, chalk-board and ICT tools	Assignment, Seminar, performance & regularity in laboratory and Sessional examination	1. Students will enable to learn the basic concepts of mechanics. 2. Enable the students to understand conservation laws as they are the fundamental laws of nature and will help them in realizing a crucial phenomenon of nature-symmetry	30(theory) + 24(Lab)

Paper /unit	Course Content	Topic of discussion	Teaching methods	Assessment method	Learning outcome	No. of classes
C3	Electricity And Magnetism (Theory and Lab)	1. Electric field lines. Electric flux. Gauss' Law and its applications 2. Conservative nature of Electrostatic Field. Laplace's and Poisson equations. 3. The Uniqueness Theorem. Potential and Electric Field of a dipole. Force and Torque on a dipole. 4. Electrostatic energy of a charged sphere. 5. Capacitance of a system of charged conductors. Parallel-plate capacitor. Capacitance of an isolated conductor. Method of Images and its application to (1) Plane Infinite Sheet and (2) Sphere. 6. Dielectric Properties of Matter: Polarization, Electrical Susceptibility and Dielectric Constant. 7. Biot-Savart's Law and its simple applications 8. Current Loop as a Magnetic Dipole and its Dipole Moment 9. Ampere's Circuital Law and its application 10. Magnetic Properties of Matter 11. Electromagnetic Induction	Power-point presentation, chalk-board and ICT tools	Assignment, Seminar, performance & regularity in laboratory and Sessional examination	1. Students will enable to develop the basic theoretical knowledge as well as experimental skills of the students on electrical networking. 2. Train the students to handle and repair instruments based on electric and magnetic field effects	49(theory) + 24(Lab)

Paper /unit	Course Content	Topic of discussion	Teaching methods	Assessment method	Learning outcome	No. of classes
C9	Elements Of Modern Physics (Theory and Lab)	1. Planck's quantum hypothesis and Blackbody Radiation. 2. Quantum theory of Light; Photo-electric effect and Compton scattering 3. Davisson-Germer experiment. 4. Wave-particle duality, Heisenberg uncertainty principle 5. Matter waves and wave amplitude; Schrodinger equation for non-relativistic particles 6. physical interpretation of a wave function, probabilities and normalization 7. One dimensional infinitely rigid box 8. Quantum mechanical scattering and tunneling in one dimension-across a step potential & rectangular potential barrier 9. Liquid Drop model: semi-empirical mass formula and binding energy, Nuclear Shell Model and magic numbers. 10. Radioactivity: stability of the nucleus 11. Fission and fusion 12. Nuclear reactor	Power-point presentation, chalk-board and ICT tools	Assignment, Seminar, performance & regularity in laboratory and Sessional examination	1. Students will enable to understand and appreciate the theory of modern physics 2. Develop the ability to apply it in solving simple problems in Quantum Mechanics (QM), structure of atoms, Laser, and Nuclear Physics	56(theory) + 28(Lab)

Paper /unit	Course Content	Topic of discussion	Teaching methods	Assessment method	Learning outcome	No. of classes
C11	Quantum Mechanics And Applications (Theory and Lab)	1. Schrodinger equation: time dependent and time independent 2. Properties of Wave Function. Interpretation of Wave Function Probability and probability current densities in three dimensions; Conditions for Physical Acceptability of Wave Functions. Normalization 3. Hamiltonian, stationary states and energy eigenvalues; 4. General discussion of bound states in an arbitrary potential: Frobenius method; Hermite polynomials; ground state, zero-point energy & uncertainty principle 5. Quantum theory of hydrogen-like atoms 6. Atoms in Electric & Magnetic Fields 7. Atoms in External Magnetic Fields 8. Many electron atoms: Pauli's Exclusion Principle. Symmetric & Antisymmetric Wave Functions	Power-point presentation, chalk-board and ICT tools	Assignment, Seminar, performance & regularity in laboratory and Sessional examination	1. Students will enable to learn how to apply quantum mechanics to solve physical systems in different areas of science. 2. Know about the physical behavior of materials. 3. Learn how the scientific behavior of materials can be used for human applications.	60(theory) + 30(Lab)

Paper /unit	Course Content	Topic of discussion	Teaching methods	Assessment method	Learning outcome	No. of classes
DSE 4	Nano Materials And Applications (Theory and Lab)	1. Length scales in Physics, Nanostructures: 1D, 2D and 3D nanostructures (nanodots, thin films, nanowires, nanorods) 2. Quantum confinement: Applications of Schrodinger equation 3. Characterization: X- ray diffraction, Optical Microscopy, Scanning electron Microscopy, Transmission Electron Microscopy, Atomic Force Microscopy, Scanning Tunnelling Microscopy 4. Optical properties: Concept of dielectric constant for nanostructures and charging of nanostructure. Quasi-particles and excitons. Excitons in direct and indirect band gap semiconductor nanocrystals. 5. Electron transport 6. Applications of nanoparticles, quantum dots, nanowires and thin films for photonic devices (LED, solar cells). Single electron transfer devices	Power-point presentation, chalk-board and ICT tools	Assignment, Seminar, performance & regularity in laboratory and Sessional examination	1. Students will enable to gather sufficient knowledge about the fascinating behavior of nanomaterials and tuning of such properties for different applications. 2. Obtain information on experimental methodologies with necessary theoretical background, which may be useful for pursuing further study on the areas of nanoscience and technology	60(theory) + 30(Lab)

Paper /unit	Course Content	Topic of discussion	Teaching methods	Assessment method	Learning outcome	No. of classes
GE1	Mechanics (Theory and Lab)	1. Laws of Motion 2. Momentum and Energy 3. Rotational Motion 4. Gravitation 5. Oscillations 6. Elasticity 7. Special Theory of Relativity	Power-point presentation, chalk-board and ICT tools	Assignment, Seminar, performance & regularity in laboratory and Sessional examination	1. Students will enable to develop basic knowledge of mechanics as it is helpful to study any other course in science discipline. 2. Develop knowledge of vector algebra and differential equations which will help students in the study of theoretical courses in science	50(theory) + 24(Lab)
GE-2	Electricity And Magnetism (Theory and Lab)	1. Gauss's theorem of electrostatics. Applications of Gauss theorem- Electric field due to point charge 2. Electric potential as line integral of electric field 3. Dielectric medium, Polarisation, Displacement vector 4. Biot-Savart's law and its applications 5. Magnetic properties of materials	Power-point presentation, chalk-board and ICT tools	Assignment, Seminar, performance & regularity in laboratory and Sessional examination	1. Students will enable to perform quantitative analyses of basic problems in Electrostatics and Magneto dynamics. 2. Apply Gauss's Law, Ampere's Law, and Biot-Savart Law to solving practical problems in electricity and magnetism.	32(theory) + 14(Lab)

Lesson Plan

Name and designation of teacher : Dr Prathana Borah
Assistant Professor, Department of Physics

Course : B. Sc. (Core and General Elective)

Programme : Undergraduate

Paper code : C4, C6, C8, DSE 1, C14, GE3, GE4

Class allotted (per week) : 20

Paper /unit	**Course Content**	**Topic of discussion**	**Teaching methods**	**Assessment method**	**Learning outcome**	**No. of classes**
C4	Waves And Optics (Theory and Lab)	1. Superposition of Collinear Harmonic oscillations 2. Graphical and Analytical Methods. Lissajous Figures 3. Wave Motion and Velocity of Waves 4. Standing Waves in a String: Analytical Treatment 5. Holography	Power-point presentation, chalk-board and ICT tools	Assignment, Seminar, performance & regularity in laboratory and Sessional examination	1. Learn the basics of wave motion 2. Analyze some of the fundamental laws and principles of light which is used in many important optical instruments 3. Train the students to use different optical instruments 4. Help the students to understand various natural phenomena using different apparatus in the laboratory	30(theory) + 24(Lab)

Paper /unit	Course Content	Topic of discussion	Teaching methods	Assessment method	Learning outcome	No. of classes
C6	Thermal Physics (Theory and Lab)	1. Zeroth Law of Thermodynamics & Concept of Temperature 2. First law of Thermodynamics and its applications 3. 2nd Law of Thermodynamics and its applications 4. Concept of Entropy, Principle of entropy and its application 5. Thermodynamics potential: Their Definitions, Properties and Applications 6. Maxwell's Thermodynamic Relations 7. Distribution of Velocities: Maxwell-Boltzmann Law of Distribution of Velocities in an Ideal Gas and its Experimental Verification 8. Transport Phenomenon in Ideal Gases 9. Behavior of Real Gases: Deviations from the Ideal Gas Equation 10. Van der Waal's Equation of State for Real Gases	Power-point presentation, chalk-board and ICT tools	Assignment, Seminar, performance in laboratory and Sessional examination	1. Develop knowledge on the classical laws of thermodynamics and their application 2. Use the knowledge of thermodynamics in various applications in allied fields like Materials science, Condensed matter Physics, Atmospheric Physics, Solar Physics, etc. 3. Demonstrate a working knowledge of the physical principles in Thermal Physics	60(theory) + 30(Lab)

Paper /unit	Course Content	Topic of discussion	Teaching methods	Assessment method	Learning outcome	No. of classes
C8	Mathematical Physics-III (Theory and Lab)	1. Complex Numbers and their Graphical Representation. 2. Functions of Complex Variables 3. Analyticity and Cauchy-Riemann Conditions. Examples of analytic functions 4. Cauchy's Inequality. Cauchy's Integral formula 5. Laurent and Taylor's expansion. 6. Residues and Residue Theorem 7. Fourier Integral theorem. 8. Fourier transform of trigonometric, Gaussian, finite wave train & other functions. 9. Representation of Dirac delta function as a Fourier Integral. 10. Fourier transform of derivatives, 11. Convolution theorem. Properties of Fourier transforms 12. Laplace Transform (LT) of Elementary functions. Inverse LT. 13. Properties of LTs 14. LTs of 1st and 2nd order Derivatives and Integrals of Functions. 15. LT of Unit Step function, Dirac Delta function, Periodic Functions. 16. Convolution Theorem.	Power-point presentation, chalk-board and ICT tools	Assignment, Seminar, performance in laboratory and Sessional examination	1. Student will be able to identify a range of diverse mathematical techniques/ideas to formulate, simplify and solve some problems in Physics 2. Enable a student to understand the use and importance of computational/ numerical methods in Physics and to construct a problem computationally 3. Prepare a student for more advanced topics in Physics by providing a solid grip over the fundamental concepts in Physics.	60(theory) + 30(Lab)

Paper /unit	Course Content	Topic of discussion	Teaching methods	Assessment method	Learning outcome	No. of classes
DSE1	Classical Dynamics (Theory)	1. Classical Mechanics of Point Particles: Generalized coordinates and velocities, Lagrange equation of motion, Hamiltonian principle 2. Hamilton's equations of motion. 3. Applications: Hamiltonian for a harmonic oscillator, solution of Hamilton's equation for Simple Harmonic Oscillations; particle in a central force field- conservation 4. Small Amplitude Oscillations 5. Special Theory of Relativity: Four-vectors: space-like, time-like and light-like, 6. Doppler effect from a four-vector perspective 7. Concept of four-force. 8. Conservation of four-momentum. Relativistic kinematics. Application to two-body decay of an unstable particle 9. Fluid Dynamics: continuity equation and mass conservation, stream-lined motion, laminar flow 10. Navier-Stokes equation, qualitative description of turbulence	Power-point presentation, chalk-board and ICT tools	Assignment, Seminar, and Sessional examination	1. Student will be able to understand the underlying facts in the development of classical mechanics and the advantages of its formulation over Newtonian mechanics. 2. Develop basic theoretical ingredients necessary to study advanced theoretical courses like quantum mechanics. 3. Learn a number of mathematical techniques applicable to Physics problems in different areas. 4. Develop knowledge of special relativity which is essential to understand the relativistic formulation of modern theories. 5. Course the theoretical analysis of systems oscillating with small amplitudes	80(theory)

Paper /unit	Course Content	Topic of discussion	Teaching methods	Assessment method	Learning outcome	No. of classes
C 14	Statistical Mechanics (Theory and Lab)	1. Classical Statistics: Maxwell-Boltzmann Distribution Law 2. Partition Function 3. Classical Entropy Expression, Gibbs Paradox 4. Sackur Tetrode equation 5. Thermodynamic Functions of a Two-Energy Levels System, Negative Temperature 6. Properties of Thermal Radiation. Blackbody Radiation 7. Stefan-Boltzmann law: Thermodynamic proof. Radiation Pressure 8. Saha's Ionization Formula. 9. Rayleigh-Jean's Law. Ultraviolet Catastrophe 10. Spectral Distribution of Black Body Radiation. 11. Planck's Quantum Postulates 12. Bose-Einstein Statistics: Bose Einstein condensation 13. Fermi-Dirac Distribution Law 14. Thermodynamic functions of a Completely and strongly Degenerate Fermi Gas 15. Relativistic Fermi gas	Power-point presentation, chalk-board and ICT tools	Assignment, Seminar, performance in laboratory and Sessional examination	1. Equip the students with basic knowledge of the Statistical Mechanics and hence will be able to look critically for analyzing any physical phenomena. 2. Create interest to the subject to pursue further higher study in future. 3. Enable the students to solve any challenging physical problem in statistical mechanics	60(theory) + 30(Lab)

Paper /unit	Course Content	Topic of discussion	Teaching methods	Assessment method	Learning outcome	No. of classes
GE3	Thermal Physics And Statistical Mechanics (Theory and Lab)	1. Laws of Thermodynamics 2. Thermodynamic Potentials 3. Kinetic Theory of Gases	Power-point presentation, chalk-board and ICT tools	Assignment, Seminar, performance in laboratory and Sessional examination	1. Students will enable to understand a working knowledge of the physical principles describing the thermal physics. 2. Apply laws of thermodynamics and statistical mechanics to a range of situations in real world problems	43(theory) + 16(Lab)
GE4	Waves And Optics (Theory and Lab)	1. Superposition of Two Collinear Harmonic oscillations 2. Lissajous Figures 3. Waves Motion 4. Sound	Power-point presentation, chalk-board and ICT tools	Assignment, Seminar, performance in laboratory and Sessional examination	1. Student will be able to learn the basic ideas of the behavior of light based on its wave nature. 2. Justify different phenomena due to light and the interaction of light among them and with matter. 3. Use different optical instruments	25(theory) +14(Lab)

Lesson Plan

Name and designation of teacher : Mr. Biki Prasad
NC1, Department of Physics

Course : B. Sc. (Core and General Elective)

Programme : Undergraduate

Paper code : C1, C5, DSE5

Class allotted (per week) : 16

Paper /unit	Course Content	Topic of discussion	Teaching methods	Assessment method	Learning outcome	No. of classes
C1	Mathematical Physics-I (Theory and Lab)	1. Calculus 2. First Order and Second Order Differential equations 3. Statement of existence and Uniqueness Theorem for Initial Value Problems 4. Calculus of functions of more than one variable: Partial derivatives, exact and inexact differentials 5. Vector Calculus: Scalar product and its invariance under rotations. Vector product 6. Vector Differentiation and vector integration 7. Orthogonal Curvilinear Coordinates	Power-point presentation, chalk-board and ICT tools	Assignment, Seminar, performance & regularity in laboratory and Sessional examination	1. Students will enable to develop the requisite mathematical skills of a student to understand the fundamental topics in Physics. 2. Develop the ability of a student to critically analyze a topic. 3. Demonstrate the use and importance of computational methods in Physics and enable a student to construct a Physics problem computationally.	54(theory) + 24(Lab)

Paper /unit	Course Content	Topic of discussion	Teaching methods	Assessment method	Learning outcome	No. of classes
C5	Mathematical Physics-II (Theory and Lab)	1. **Fourier Series**: Dirichlet Conditions 2. Expansion of periodic functions in a series of sine and cosine functions and determination of Fourier coefficients. 3. Complex representation of Fourier series. 4. Even and odd functions and their Fourier expansions. 5. Frobenius method and its applications to differential equations. 6. Legendre, Bessel, Hermite and Laguerre Differential Equations. Properties of Legendre Polynomials: 7. Rodrigues Formula 8. Bessel Functions of the First Kind: Generating Function, simple recurrence relations. 9. Solutions to partial differential equations, using separation of variables	Power-point presentation, chalk-board and ICT tools	Assignment, Seminar, performance & regularity in laboratory and Sessional examination	1. Students will enable to develop the ability of a student to critically analyze a topic. 2. Prepare a student for more advanced topics in Physics by providing a solid grip over the fundamental concepts in Physics. 3. Enable a student to understand the use and importance of computational / numerical methods in Physics and enable a student to construct a Physics problem computationally.	50(theory) + 24(Lab)

Paper /unit	Course Content	Topic of discussion	Teaching methods	Assessment method	Learning outcome	No. of classes
DSE 2	Astronomy & Astrophysics (Theory)	1. Astronomical Scales 2. Basic concepts of positional astronomy 3. Spherical Triangle Astronomical Coordinate Systems, Geographical Coordinate Systems, Horizon System, Equatorial System 4. Basic Parameters of Stars: Determination of Distance by Parallax Method; Brightness, Radiant Flux and Luminosity 5. Astronomical techniques 6. Physical principles: Gravitation in Astrophysics (Virial Theorem, Newton versus Einstein), Systems in Thermodynamic Equilibrium 7. The sun and the solar family 8. Stellar spectra and classification Structure 9. Galaxies 10. Large scale structure & expanding universe	Power-point presentation, chalk-board and ICT tools	Assignment, Seminar, performance & regularity in laboratory and Sessional examination	1. Students will enable to equip the students with basic knowledge of the Astrophysics. 2. Create interest to the subjects of Astrophysics and to pursue further higher studies in the subject concerned in future. 3. Develop the critically analyzing ability, which may motivate the students to solve any challenging physical problem in future	80(theory)

Lesson Plan

Name and designation of teacher : Mr. Hemanta Tanti
NC2, Department of Physics

Course : B. Sc. (Core and General Elective)

Programme : Undergraduate

Paper code : C1, C3, C5, C9, C13

Class allotted (per week) : 16

Paper /unit	**Course Content**	**Topic of discussion**	**Teaching methods**	**Assessment method**	**Learning outcome**	**No. of classes**
C1	Mathematical Physics-I (Theory and Lab)	1. Introduction to probability: 2. Dirac Delta function and its properties	Power-point presentation, chalk-board and ICT tools	Assignment, Seminar, performance & regularity in laboratory and Sessional examination	Student will enable to develop the ability of a student to critically analyze a topic.	06(theory)
C3	Electricity And Magnetism	1. Electrical Circuits 2. Network theorems: 3. Ballistic Galvanometer	Power-point presentation, chalk-board and ICT tools	Assignment, Seminar, performance & regularity in laboratory and Sessional examination	Students will enable to develop the basic theoretical knowledge as well as experimental skills of the students on electrical networking.	12(theory)
C5	Mathematical Physics-II (Theory and Lab)	1. Beta and Gamma Functions and Relation between them 2. Systematic and Random Errors. Propagation of Errors	Power-point presentation, chalk-board and ICT tools	Assignment, Seminar, performance & regularity in laboratory and Sessional examination	Students will enable to develop the ability of a student to critically analyze a topic	10(theory)
C9	Elements Of Modern Physics (Theory and Lab)	1. Lasers	Power-point presentation, chalk-board and ICT tools	Assignment, Seminar, performance & regularity in laboratory and Sessional examination	Develop the ability to apply it in solving simple problems in Quantum Mechanics (QM), structure of atoms, Laser, and Nuclear Physics	4(theory)

Paper /unit	Course Content	Topic of discussion	Teaching methods	Assessment method	Learning outcome	No. of classes
C13	Electro-magnetic Theory (Theory and Lab)	1. Maxwell Equations 2. Poynting Theorem and Poynting Vector. 3. Electromagnetic (EM) Energy Density. 4. Physical Concept of Electromagnetic Field Energy Density, Momentum Density and Angular Momentum Densit 5. EM Wave Propagation in Unbounded Media 6. Wave propagation through dilute plasma, electrical conductivity of ionized gases, plasma frequency, refractive index, skin depth, application to propagation through ionosphere. 7. EM Wave in Bounded Media 8. Brewster's law 9. Polarization of Electromagnetic Waves 10. Rotatory Polarization 11. Planar optical wave guides 12. Optical Fibres	Power-point presentation, chalk-board and ICT tools	Assignment, Seminar, performance & regularity in laboratory and Sessional examination	1. Student will enable to solve problems relevant to interfaces between media with defined boundary conditions. 2. Use Maxwell's equations to describe the behaviour of electromagnetic waves in vacuum as well as medium. 3. Describe states and methods of polarization and analyze the polarization state of a light source.	60(theory) + 24(Lab)

Paper /unit	Course Content	Topic of discussion	Teaching methods	Assessment method	Learning outcome	No. of classes
GE1	Mechanics (Theory and Lab)	1. Vector algebra. Scalar and vector products. Derivatives of a vector with respect to a parameter 2. Ordinary Differential Equations	Power-point presentation, chalk-board and ICT tools	Assignment, Seminar, performance & regularity in laboratory and Sessional examination	Student will enable to develop the ability of a student to critically analyze a topic.	10(theory) +6(Lab)
GE3	Thermal Physics And Statistical Mechanics (Theory and Lab)	1. Transport Phenomena 2. Theory of Radiation 3. Statistical Mechanics	Power-point presentation, chalk-board and ICT tools	Assignment, Seminar, performance & regularity in laboratory and Sessional examination	1. Students will enable to understand a working knowledge of the physical principles describing the thermal physics. 2. Apply laws of thermodynamics and statistical mechanics to a range of situations in real world problems	20(theory) +14(Lab)