Lecture Plan Physics

Semester	Sem-1 MATHEMATICAL PHYSICS-I CC-1
Course name	B.Sc. Physics Hons.
Text books	
Text 1	
Text 2	
References books	
Reference 1	Mathematical Physics - B S Rajput
Reference 2	Mathematical Physics - B D Gupta
Lecture	**Lecture title**
2	**Differential Equations:**
5	First Order and Second Order Differential equations:
4	Homogeneous Equations with constant coefficients. Wronskian and general solution.
5	Partial Differential Equations: Solutions to partial differential equations, using separation of variables:
4	Vector Differentiation: Gradient of a scalar field and its geometrical interpretation.
2	Divergence and curl of a vector field.
3	Del and Laplacian operators. Vector identities. Expression for divergence and curl in cartesian coordinate.
3	Vector Integration: Notion of infinitesimal line, surface and volume elements.
4	Line, surface and volume integrals of Vector fields. Flux of a vector field.
4	Gauss' divergence theorem, Green's and Stokes Theorems

Lecture Plan Physics

Semester	Sem-1 MECHANICS CC-2
Course name	B.Sc. Physics Hons.
Text books	
Text 1	
Text 2	
References books	
Reference 1	Mechanics, D.S. Mathur, S. Chand and Company Limited, 2000
Reference 2	Introduction to Special Relativity, R. Resnick, 2005, John Wiley and Sons.
Lecture	**Lecture title**
4	Elasticity: Relation between Elastic constants.
2	Twisting torque on a Cylinder or Wire,
4	Bending moment, Cantiliver, beam supported at the end and loaded at middle
3	Fluid Motion: Poiseuille's Equation for Flow of a Liquid through a Capillary Tube,
2	Mayer's equations, Rankine methods for measurement of viscosity of gas.
4	Hydrodynamics: Equation of continuity and deduction of Euler's equation
2	Surface Tension: principle of virtual work and
3	its use to obtain expression for the pressure on two sides of curved liquid surface.
2	Ripples and Gravity waves, Quincke's method.
4	Special Theory of Relativity: Galilean transformation, Michelson-Morley Experiment and its outcome.
1	Postulates of Special Theory of Relativity.
1	Lorentz Transformations.
2	Length contraction. Time dilation.
2	Relativistic addition of simultaneity,.
5	Variation of mass with velocity.Massless Particles. Mass-energy Equivalence. Relativistic Doppler effect of light

Lecture Plan Physics

Semester	Sem-2 (ELECTRICITY AND MAGNETISM) CC-3
Course name	B.Sc. Physics Hons.
Text books	
Text 1	
Text 2	
References books	
Reference 1	Electricity, Magnetism & Electromagnetic Theory, S. Mahajan and Choudhury, 2012, TMH
Reference 2	Electricity and Magnetism K K Tewary S. Chand.
Lecture	**Lecture title**
3	Conservative nature of Electrostatic Field. Electrostatic Potential.
3	Laplace's and Poisson equations & its solution in Cartesian coordinates,
1	The Uniqueness Theorem.
3	Gauss' law in integral and differential form. Multipole expansion (monopole, dipole & quadrupole), energy density in an electric field
3	Electric Field in matter. Polarization, Polarization Charges.
2	Electrical Susceptibility and Dielectric Constant.
3	Capacitor (parallel plate, spherical, cylindrical) filled with dielectric.
2	Displacement vector D. Relations between E, P and D.
3	Gauss' Law in dielectrics, Solutions of electrostatic and Magnetostatic problems including boundry value problems
3	Transients: Growth and Decay of currents in LR, CR , LC and LCR circuits
2	Magnetization vector (M). Magnetic Intensity(H). Magnetic Susceptibility and permeability.Relation between B, H, M
3	Kirchhoff's laws for AC circuits. Complex Reactance and Impedance.
2	Series LCR Circuit: (1) Resonance, (2) Power Dissipation and (3) Quality Factor, and (4) Band Width. Parallel LCR Circuit.
3	Anderson's bridge, De Sauty's Bridge and Owen's bridge & their vector diagram representation. Three phase electrical power supply, delta and star connections.
2	Ideal Constant-voltage and Constant-current Sources.
3	Network Theorems: Thevenin theorem, Norton theorem,
3	Maximum Power Transfer theorem and Superposition Theorem
3	Torque on a current Loop. Ballistic Galvanometer: Current and Charge Sensitivity. Electromagnetic damping. Logarithmic damping

Lecture Plan Physics

Semester	Sem-2 WAVES AND OPTICS, CC-4
Course name	B.Sc. Physics Hons.
Text books	
Text 1	
Text 2	
References books	
Reference 1	Introduction to Geometrical and Physical Optics, B. K. Mathur
Reference 2	Geometrical and Physical Optics, P. K. Chakraborty
Lecture	**Lecture title**
2	: Plane Progressive (Travelling) Waves. Wave Equation. Particle and Wave Velocities.
2	Differential Equation. Pressure of a Longitudinal Wave. Energy Transport. Intensity of Wave
3	Free Vibration,Damped oscillation. Forced oscillations:
2	Transient and steady states; Resonance, sharpness of resonance; power dissipation and Quality Factor
3	: Standing (Stationary) Waves in a String: Fixed and Free Ends.
3	Analytical Treatment. Phase and Group Velocities,
2	changes with respect to position and time, energy of vibrating string, transfer of energy
2	Velocity of Transverse Vibrations of Stretched Strings,
3	Velocity of Longitudinal waves in a fluid in pipe, Newton's Formula for Velocity of Sound, Laplace's Correction.
3	Acoustics of building, reverberation of time, growth and decay of sound, Sabine's formula
2	Division of amplitude and wavefront. Interference in Thin Films. Fringes of equal inclination (Haidinger Fringes);
3	Fringes of equal thickness (Fizeau Fringes). Newton's Rings: Measurement of wavelength and refractive index
2	Michelson Interferometer-(1) Idea of form of fringes (No theory required), (2) Determination of Wavelength,
3	(3) Wavelength Difference, (4) Refractive Index, and (5) Visibility of Fringes.
2	Fabry-Perot interferometer
3	Single slit. Circular aperture and airy pattern,
3	Resolving Power of a telescope. Double slit. Plane transmission grating. Resolving power of grating.
2	Fresnel's Assumptions. Fresnel's Half-Period Zones for Plane Wave,
3	Explanation of Rectilinear Propagation of Light. Theory of a Zone Plate: Multiple Foci of a Zone Plate

Lecture Plan Physics

Semester	Sem-3 MATHEMATICAL PHYSICS-II AND THERMAL PHYSICS CC-5
Course name	B.Sc. Physics Hons.
Text books	
Text 1	
Text 2	
References books	
Reference 1	A treatise on heat- Megh Nath Sah & B.N.Srivastava
Reference 2	Mathematical Physics by B.S.Rajpoot
Lecture	**Lecture title**
2	Periodic functions. Orthogonality of sine and cosine functions,
3	Dirichlet Conditions. Expansion of periodic functions in a series of sine and cosine functions and determination of Fourier coefficients.
2	Complex representation of Fourier series. .
3	Fourier's Theorem, Analysis of saw tooth, triangular and square wave form
3	Maxwell-Boltzmann Law of Distribution of Velocities in an Ideal Gas and its Experimental Verification.
3	Mean, RMS and Most Probable Speeds. Degrees of Freedom.
3	Law of Equipartition of Energy, Specific heats of mono-,dia- and tri-atomic Gases
3	Mean Free Path,Collision Probability.
5	Clausius and Maxwell Derivations of mean free path. Transport Phenomenon in Ideal Gases: (1) Viscosity, (2) Thermal Conductivity and (3) Diffusion.
2	Brownian Motion-Einstein’s theory and experimental determination of Avogadro’s number
3	Behavior of Real Gases: Deviations from the Ideal Gas Equation. Andrew’s Experiments on CO2 Gas.
2	Critical Constants. Continuity of State. Boyle Temperature.
3	Van der Waal’s Equation of State for Real Gases using Virial theorem.
3	Values of Critical Constants. Law of Corresponding States. Comparison with Experimental Curves. p-V Diagrams.
2	Theory of Joule-Thomson effect, Porous Plug Experiment. J-T effect for perfect and Van der Waal gases,
2	Temperature of Inversion & Critical temperature. Joule- Thomson Cooling, Relation between Boyle temperature.

Lecture Plan Physics

Semester	Sem-3 (PHYSICS OF THERMODYNAMICS) CC-6
Course name	B.Sc. Physics Hons.
Text books	
Text 1	
Text 2	
References books	
Reference 1	A treatise on heat- Megh Nath Sah & B.N.Srivastava
Reference 2	Advanced text book on Heat -P.K.Chakravarti
Lecture	**Lecture title**
3	Zeroth Law of Thermodynamics, First Law of Thermodynamics and its differential form,
4	Internal Energy, First Law & various processes, Applications of First Law: General Relation between CP and CV,
4	Work Done during Isothermal and Adiabatic Processes, Compressibility and Expansion Co-efficient.
3	Reversible and Irreversible process with examples. Conversion of Work into Heat and Heat into Work. Heat Engines.
3	Carnot's Cycle, Carnot engine & efficiency. Refrigerator & coefficient of performance,
3	2ndLaw of Thermodynamics: Kelvin-Planck and Clausius Statements and their Equivalence. Carnot's Theorem.
2	Applications of Second Law of Thermodynamics: Thermodynamic Scale of Temperature and its Equivalence to Perfect Gas Scale
3	Concept of Entropy, Clausius Theorem. Clausius Inequality, Second Law of Thermodynamics in terms of Entropy.
2	Entropy of a perfect gas. Principle of Increase of Entropy.
2	Entropy Changes in Reversible and Irreversible processes with examples.Entropy of the Universe.
3	Temperature–Entropy diagrams for Carnot's Cycle. Third Law of Thermodynamics. Unattainability of Absolute Zero
3	Thermodynamic Potentials: Internal Energy, Enthalpy, Helmholtz Free Energy, Gibb's Free Energy.
3	Their Definitions, Properties and Applications. First and second order Phase Transitions with examples, Clausius Clapeyron Equation
2	Derivations and applications of Maxwell's Relations, Maxwell's Relations:(1) Clausius Clapeyron equation,
2	(2) Values of Cp-Cv, (3) Tds Equations, (4) Joule-Kelvin coefficient for Ideal and Van der Waal Gases,
2	(5) Energy equations, (6) Change of Temperature during Adiabatic Process.

Lecture Plan Physics

Semester	Sem-3 (ANALOG SYSTEMS AND APPLICATIONS) CC-7
Course name	B.Sc. Physics Hons.
Text books	
Text 1	
Text 2	
References books	
Reference 1	Integrated Electronics -J.Millman
Reference 2	Electricity and Electronics -D.N.Tripathi
Lecture	**Lecture title**
2	Derivation of Richardson's formula, P and N type semiconductors.
2	Energy Level Diagram.Conductivity and Mobility, Concept of Drift velocity. Static and Dynamic Resistance.
2	Current equation Mechanism in Forward and Reverse Biased Diode. .
3	Derivation for Barrier Potential, Barrier Width and Current for Step Junction
3	(1) Rectifier Diode: Half-wave Rectifiers. Centre-tapped and Bridge Full-wave Rectifiers,
3	Calculation of Ripple Factor and Rectification Efficiency, C-filter (2) Zener Diode and Voltage Regulation.
5	n-p-n and p-n-p Transistors. Characteristics of CB, CE and CC Configurations.
3	Current gains and and Relations between and . Load Line analysis of Transistors. DC Load line and Q-point.
2	Physical Mechanism of Current Flow.Active, Cutoff and Saturation Regions.
3	Transistor Biasing and Stabilization Circuits. Fixed Bias and Voltage Divider Bias.
3	Transistor as 2-port Network. h-parameter Equivalent Circuit. Analysis of a single-stage CE amplifier using Hybrid Model.
3	Input and Output Impedance. Current, Voltage and Power Gains. Classification of Class A, B & C Amplifiers.
4	Two stage RC-coupled amplifier and its frequency response
5	Effects of Positive and Negative Feedback on Input Impedance, Output Impedance, Gain, Stability, Distortion and Noise.
3	Barkhausen's Criterion for self-sustained oscillations. RC Phase shift oscillator, determination of Frequency.
2	Hartley & Colpitts oscillators, Wien Bridge Oscillator.

Lecture Plan Physics

Semester	Sem-4(MATHEMATICAL PHYSICS-III) CC- 8
Course name	B.Sc. Physics Hons.
Text books	
Text 1	
Text 2	
References books	
Reference 1	Mathematical Physics- H K Dass
Reference 2	Mathematical Physics -B.S.Rjput
Lecture	**Lecture title**
4	Brief Revision of Complex Numbers and their Graphical Representation. Euler's formula,
3	De Moivre's theorem, Roots of Complex Numbers. Functions of Complex Variables.
3	Analyticity and Cauchy-Riemann Conditions. Examples of analytic functions.
4	Singular functions: poles and branch points, order of singularity. Integration of a function of a complex variable.
5	Cauchy's Inequality & Theorem. Cauchy's Integral formula. Laurent and Taylor's Theorem. Residues and Cauchy's Residue Theorem.
4	Fourier Integral theorem. Fourier Transform. Examples. Fourier transform of trigonometric, Gaussian, finite wave train & other functions.
3	Representation of Dirac delta function as a Fourier Integral.
2	Fourier transform of derivatives, Inverse Fourier transform, Convolution theorem.
3	Properties of Fourier transforms (translation, change of scale, complex conjugation, etc.).
2	Three dimensional Fourier transform with examples, .
2	Application of Fourier transforms to differential equations: one dimensional wave and diffusion/heat flow equations
3	Laplace Transform (LT) of Elementary functions. Properties of LTs:
3	Change of Scale Theorem, Shifting Theorem. LTs of 1st and 2nd order Derivatives and Integrals of Functions,
2	Derivatives and Integrals of LTs. LT of Unit Step function,

Lecture Plan Physics

Semester	Sem-4(ELEMENTS OF MODERN PHYSICS) CC-9
Course name	B.Sc. Physics Hons.
Text books	
Text 1	
Text 2	
References books	
Reference 1	Quantum Mechanics: Theory & Applications, A.K.Ghatak & S.Lokanathan, 2004, Macmillan
Reference 2	Quantum Physics, Berkeley Physics, Vol.4. E.H.Wichman, 1971, Tata McGraw-Hill Co.
Lecture	**Lecture title**
2	Planck's quantum, Planck's constant and light as a collection of photons;
3	Blackbody Radiation: Quantum theory of Light; Photo-electric effect and Compton scattering.
3	De Broglie wavelength and matter waves; Davisson-Germer experiment.Wave description of particles by wave packets.
2	Group and Phase velocities and relation between them, two slit experiment with electrons,
2	probability, wave amplitude and wave functions, Bohr Correspondence Principle
2	Position measurement-gamma ray microscope through experiment,
2	Wave-particle duality, Heisenberg uncertainty principle (Uncertainty relations involving Canonical pair of variables):
3	Derivation from Wave Packets impossibility of a particle following a trajectory; estimating minimum energy of a confined particle using uncertainty principle,
1	Energy-time & Position-momentum uncertainty principle
3	Two slit interference experiment with photons, atoms and particles;
2	linear superposition principle as a consequence; Matter waves and wave amplitude;
3	Schrodinger equation for non-relativistic particles; Momentum and Energy operators; stationary states; physical interpretation of a wave function,
2	probabilities and normalization; Probability and probability current densities in one dimension
2	Size and structure of atomic nucleus and its relation with atomic weight;
2	Impossibility of an electron being in the nucleus as a consequence of the uncertainty principle.
2	Nature of nuclear force, Liquid Drop model: semi-empirical mass formula and binding energy
5	Radioactivity
2	Spontaneous and Stimulated emissions. Einstein's A and B coefficients. Metastable states.

3	Optical Pumping and Population Inversion. Three-Level laser system and He-Ne Laser and Ruby Laser

Lecture Plan Physics

Semester	Sem-4(DIGITAL SYSTEMS AND APPLICATIONS) CC-10
Course name	B.Sc. Physics Hons.
Text books	
Text 1	
Text 2	
References books	
Reference 1	Fundamentals of Digital Circuits, Anand Kumar, 2nd Edn, 2009, PHI Learning Pvt. Ltd
Reference 2	Digital Circuits and systems, Venugopal, 2011, Tata McGraw Hill.
Lecture	**Lecture Title**
3	Block Diagram of CRO. Electron Gun, Deflection System and Time Base. Deflection Sensitivity.
3	Applications of CRO: (1) Study of Waveform, (2) Measurement of Voltage, Current, Frequency, and Phase Difference.
3	De Morgan's Theorems. Boolean Laws. Simplification of Logic Circuit using Boolean Algebra.
2	Karnaugh Map -Idea of Minterms and Maxterms.
2	Conversion of a Truth table into Equivalent Logic Circuit by (1) Sum of Products Method and (2) Product of Sum Method
1	Difference between Analog and Digital Circuits.
1	Binary Numbers. Decimal to Binary and Binary to Decimal Conversion.BCD, Octal and Hexadecimal numbers
2	AND, OR and NOT Gates (realization using Diodes and Transistor).
2	NAND and NOR Gates as Universal Gates. XOR and XNOR Gates and their applications
3	Binary Addition. Binary Subtraction using 2's Complement.
4	Half and Full Adders.Half & Full Subtractors, 4-bit binary Adder & Subtractor.
4	Basic idea of Multiplexers, De-multiplexers, Decoders, Encoders, BCD to 7 segments
3	Resistive network (weighted and R-2R ladder), accuracy and resolution, A/D conversion (successive approximation).
3	block diagram and applications: Astable multivibrator and Monostable multivibrator.

Lecture Plan Physics

Semester	Sem-5(QUANTUM MECHANICS AND APPLICATION) CC-11
Course name	B.Sc. Physics Hons.
Text books	
Text 1	
Text 2	
References books	
Reference 1	Advanced Quantum Mechanics ,Satya Prakash
Reference 2	A Text book of Quantum Mechanics, P.M.Mathews and K.Venkatesan, 2nd Ed., 2010, McGraw Hill

Lecture	Lecture Title
2	Time dependent Schrodinger equation and dynamical evolution of a quantum state;
2	Properties of Wave Function.Interpretation of Wave Function Probability and probability current densities;
2	Conditions for Physical Acceptability of Wave Functions. Normalization,
3	Eigenvalues and Eigenfunctions. Expectation values of position and momentum
1	Time independent Schrodinger equation;
2	General solution of the time independent Schrodinger equation in terms of linear combinations of stationary states;
2	Application to spread of Gaussian wave-packet for a free particle in one dimension.
2	Postulates of quantum mechanics, Position, momentum, Hamitonian,and Energy operators;
2	eigenvalues and eigenfunctions, commutator of position and momentum operators
3	One dimensional infinitely rigid box- energy eigenvalues and eigenfunctions,
3	one dimensional potential step, Quantum tunnelling & rectangular potential barrier, one-dimensional square well potential
2	Electron angular momentum. Space quantization.
3	Electron Spin and Spin Angular Momentum. Larmor's Theorem.
3	Spin Magnetic Moment. Stern-Gerlach Experiment, Zeeman effect:
3	electron magnetic moment and magnetic energy, Gyromagnetic Ratio and Bohr Magneton
2	Pauli's Exclusion Principle. Symmetric & Antisymmetric Wave Functions.
3	Fine structure. Spin orbit coupling. Spectral Notations for Atomic States. Total angular momentum.
3	Vector Model. Spin-orbit coupling in atoms- L-S and J-J couplings. Hund's Rule. Term symbols. Spectra of Hydrogen and Alkali Atoms (Na).

Lecture Plan Physics

Semester	Sem-5(SOLID STATE PHYSICS) CC-12
Course name	B.Sc. Physics Hons.
Text books	
Text 1	
Text 2	
References books	
Reference 1	Solid State Physics, M.K. Mahan and P. Mahto, 2008, Bharti Bhawan
Reference 2	Introduction to Solid State Physics, Charles Kittel, 8th Edition, 2004, Wiley India Pvt. Ltd.
Lecture	**Lecture title**
1	Solids: Amorphous and Crystalline Materials.
2	Lattice Translation Vectors.Lattice with a Basis, Unit Cell, Bravais lattice (2D &3D),
3	Miller Indices. Reciprocal Lattice- properties and applications. Types of Lattices.
3	Brillouin Zones-construction & applications.
2	Diffraction of X-rays by Crystals, Bragg's Law, Laue's equation.
2	Phonons of monatomic one dimensional lattice, Linear Diatomic Chains.
2	Acoustical and Optical Phonons.Qualitative Description of the Phonon Spectrum in Solids.
3	Dulong and Petit's Law, Einstein and Debye theories of specific heat of solids.T3 law
2	Dia-, Para-, and Ferromagnetic Materials.
2	Classical Langevin Theory of dia– and Paramagnetic materials.Curie's law,
2	Weiss's Theory of Ferromagnetism and Ferromagne tic Domains.
2	Discussion of B-H Curve. Hysteresis and Energy Loss.
2	Polarization. Local Electric Field at an Atom. Electric Susceptibility. Polarizability.
2	Clausius Mosotti Equation.
3	Classical Theory of Electric Polarizability.Langevin-Debye equation
2	Kronig Penny model. Band Gap.
2	Conductor, Semiconductor (P and N type) and insulator.
3	Conductivity of Semiconductor, mobility, Hall Effect.

Lecture Plan Physics

Semester	Sem-5 DSE-1 (PHYSICS OF DEVICES & INSTRUMENTS)
Course name	B.Sc. Physics Hons.
Text books	
Text 1	
Text 2	
References books	
Reference 1	Basic Electronics: Arun Kumar, Bharti Bhawan 2007
Reference 2	Electronic devices and integrated circuits, A.K. Singh, 2011, PHI Learning Pvt. Ltd.
Lecture	**Lecture title**
3	Characteristic and small signal equivalent circuits of UJT and JFET.
2	Metal semiconductor Junction. Metal oxide semiconductor (MOS) device.
3	Ideal MOS and Flat Band voltage. SiO2-Si based MOS. MOSFET– their frequency limits.
3	Enhancement and Depletion Mode MOSFETS, CMOS. Charge coupled devices. Tunnel diode
2	Block Diagram of a Power Supply, Qualitative idea of C and L Filters.
3	T and Pi section filters. Regulators, Line and load regulation, Short circuit protection
4	Active and Passive Filters, Low Pass, High Pass, Band Pass and band Reject Filters.
4	Astable and Monostable Multivibrators using transistors
2	Introduction to communication systems: Block diagram of electronic communication system,
2	Need for modulation. Amplitude modulation. Modulation Index.
3	Analysis of Amplitude Modulated wave. Sideband frequencies in AM wave. CE Amplitude Modulator.
4	Demodulation of AM wave using Diode Detector. basic idea of Frequency, Phase, Pulse and Digital Modulation including ASK, PSK, FSK

Lecture Plan Physics

Semester	Sem-5 DSE-2 (ADVANCED MATHEMATICAL PHYSICS)
Course name	B.Sc. Physics Hons.
Text books	
Text 1	
Text 2	
References books	
Reference 1	Mathematical Methods for Physicis & Engineers, K.F.Riley, M.P.Hobson, S.J.Bence, 3rd Ed., 2006, Cambridge University Press
Reference 2	Mathematical Physics -B.S.Rjput
Lecture	**Lecture title**
2	Vector Spaces: Vector Spaces over Fields of Real and Complex numbers.
3	Examples. Vector space of functions.Linear independence of vectors.Basis and dimension of a vector space.
3	Change of basis. Subspace. Isomorphisms. Inner product and Norm. Inner product of functions: the weight function.
2	Triangle and Cauchy Schwartz Inequalities.
2	Introduction. Identity and inverse.Singular and non-singular transformations.
3	Representation of linear transformations by matrices. Similarity transformation.
3	Linear operators. Adjoint of a linear operator.Hermitian operators and their matrix representation.
2	Examples. Eigenvalues and eigenvectors of linear operators.
2	Properties of eigenvalues and eigenvectors of Hermitian and unitary operators.Functions of Hermitian operators
2	Symmetric and antisymmetric tensors.
2	Change of basis: relation between coordinate basis vectors.
3	Change of tensor components under change of coordinate system.
2	Example: Inertial coordinates & bases in Minkowski space, Lorentz transformations as coordinate transformations,
3	Elelctromagnetic tensor and change in its components under Lorentz transformations.
2	Calculus of Variations
2	Euler’s Equation. Hamilton's Principle and the Euler-Lagrange equations of motion.
3	Applications: motion of a simple pendulum, particle constrained to move on a hoop

Lecture Plan Physics

Semester	Sem-6(ELECTROMAGNETIC THEORY) CC-13
Course name	B.Sc. Physics Hons.
Text books	
Text 1	
Text 2	
References books	
Reference 1	Introduction to Electrodynamics, D.J. Griffiths, 3rd Ed., 1998, Benjamin Cummings.
Reference 2	Electromagnetic field theory fundamentals, B. Guru and H. Hiziroglu, 2004, Cambridge University Press
Lecture	**Lecture title**
3	Derivation of Maxwell's field equations.
3	Displacement Current. Boundary Conditions at Interface between Different Media
2	Propagation of EM waves through vacuum and isotropic dielectric medium,
2	transverse nature of plane EM waves,
4	refractive index and dielectric constant, wave impedance. Propagation through conducting media, relaxation time,
2	skin depth. Poynting Theorem and Poynting Vector
3	Reflection & Refraction of plane waves at plane interface between two dielectric media-Laws of Reflection & Refraction.
2	Fresnel's Formulae for perpendicular & parallel polarization cases, Brewster's law
2	Description of Linear, Circular and Elliptical Polarization.
2	Uniaxial and Biaxial Crystals. Double Refraction. Polarization by Double Refraction.Nicol Prism.
3	Ordinary & extraordinary refractive indices.Production & detection of Plane, Circularly and Elliptically Polarized Light.
3	Phase Retardation Plates: Quarter-Wave and Half-Wave Plates. Babinet Compensator and its Uses. Analysis of Polarized Light
2	Optical Rotation. Biot's Laws for Rotatory Polarization.
2	Fresnel's Theory of optical rotation.Calculation of angle of rotation.
2	Experimental verification of Fresnel's theory. Specific rotation.

Lecture Plan Physics

Semester	Sem-6(STATISTICAL MECHANICS) CC-14
Course name	B.Sc. Physics Hons.
Text books	
Text 1	
Text 2	
References books	
Reference 1	Statistical and Thermal Physics, S. Lokanathan and R.S. Gambhir. 1991, Prentice Hall
Reference 2	Statistical Mechanics, R.K. Pathria, Butterworth Heinemann: 2nd Ed., 1996, Oxford University Press.
Lecture	**Lecture title**
3	Macrostate& Microstate, Elementary Concept of Ensemble, Phase Space,
2	Entropy and Thermodynamic Probability, Boltzmann entropy relation,
2	Maxwell-Boltzmann Distribution Law, Partition Function, Thermodynamic Functions of an Ideal Gas,
3	Classical Entropy Expression, Gibbs Paradox, SackurTetrode equation.
3	Ideas of ensembles, micro-canonical, canonical and grand canonical ensembles. and expression for distribution function,
2	partition function and and calculation of themodynamic quantities
1	Spectral Distribution of Black Body Radiation.
2	Planck's Quantum Postulates. Planck's Law of Blackbody Radiation: Experimental Verification.
3	Deduction of (1) Wien's Distribution Law, (2) Rayleigh-Jeans Law, (3) Stefan-Boltzmann Law, (4) Wien's Displacement law from Planck's law.
10	Bose-Einstein distribution law, Thermodynamic functions of a strongly Degenerate Bose Gas, Bose derivation of Planck's law.
5	Fermi-Dirac Distribution Law, Thermodynamic functions of a Completely and strongly Degenerate Fermi Gas,
5	Fermi Energy, Electron gas in a Metal.

Lecture Plan Physics

Semester	Sem-6 DSE-3(CLASSICAL DYNAMICS)
Course name	B.Sc. Physics Hons.
Text books	
Text 1	
Text 2	
References books	
Reference 1	Introduction to Electrodynamics, D.J. Griffiths, 2012, Pearson Education.
Reference 2	The Classical Theory of Fields, L.D Landau, E.M Lifshitz, 4th Edn., 2003, Elsevier.
Lecture	**Lecture title**
2	Generalised coordinates and velocities. Hamilton's Principle,
2	Lagrangian and Euler-Lagrange equations.
4	Applications to simple systems such as coupled oscillators. Canonical momenta & Hamiltonian.Hamilton's equations of motion.
4	Applications: Hamiltonian for a harmonic oscillator, particle in a central force field. Poisson brackets. Canonical transformations.
2	Postulates of Special Theory of Relativity. Lorentz Transformations.
3	Minkowski space. The invariant interval, light cone and world lines. Space-time diagrams.
4	Time dilation, length contraction & twin paradox. Four-vectors: space-like, time-like & light-like.
3	Four velocity and acceleration.Four-momentum and energy-momentum relation.
5	The Electromagnetic field tensor and its transformation under Lorentz transformations: relation to known transformation properties of E and B.
4	Electric and magnetic fields due to a uniformly moving charge. Equation of motion of charged particle & Maxwell's equations in tensor form.
2	Motion of charged particles in external electric and magnetic fields.

Lecture Plan Physics

Semester	Sem-6 DSE-4 (NUCLEAR & PARTICLE PHYICS)
Course name	B.Sc. Physics Hons.
Text books	
Text 1	
Text 2	
References books	
Reference 1	Introductory nuclear Physics by Kenneth S. Krane (Wiley India Pvt. Ltd., 2008).
Reference 2	Theoretical Nuclear Physics, J.M. Blatt & V.F.Weisskopf (Dover Pub.Inc., 1991)
Lecture	**Lecture title**
3	Structure of nucleus, Discovery of the nucleus, composition. Basic properties; charge, mass, size, spin,
3	magnetic moment, electric quadruple moment, binding energy,
2	binding energy per nucleon and its observed variation with mass number of the nuclei.
5	Two nucleon system, deuteron problem, binding energy.
5	Detectors for charged particles; ion chamber, GM counter, resolving time, cloud chamber and bubble chamber
5	Need for accelerators, linear accelerators, cyclotron, synchrocyclotron.
5	Geiger-Nuttal Law, Gamow's theory of α decay
4	Rutherford's experiments of nuclear transmutation, conservation theorems,
4	Q value, threshold energy, cross-section of nuclear reactions.
3	Discovery of cosmic rays: hard and soft components,
3	discovery of muon, pion, heavy mesons and hyperons, mass and life-time determination for muon and pion.
3	Primary cosmic rays: Extensive air showers, solar modulation of primary cosmic rays,
2	effect of earth's magnetic field on the cosmic ray trajectories