

Govt. Pt. Shyamacharan Shukla College Dharsiwa, Raipur, (CG)

Department of Physics

Course outcomes

B.Sc. I, Paper I- Mechanics, oscillations and properties of matter

CO.1: This course will provide the students ability to understand the fundamental laws of motion (Newton's laws), and their application to various dynamical situations, inertial frames and non-inertial frame of references and concept of Galilean invariance.

CO.2: It will provide knowledge about the concept of conservation of energy, momentum, angular momentum and their application to basic problems like rocket propulsion.

CO.3: Central forces, study of law of gravitation and describing the motion of planets using Kepler's law of planetary motion.

CO.4: This course will provide the students ability to understand expression for the moment of inertia about the given axis of symmetry for different uniform mass distributions.

CO.5: This course will provide the students ability to explain the phenomena of simple harmonic motion and the properties of systems executing such motions.

CO.6: Deducing differential equations for waves and oscillations by using mathematical tools.

CO.7: Understanding the damped and forced oscillations by deriving differential equations.

CO.8: This course will enable the students to understand and apply the principle of elasticity, viscosity and surface tension.

CO.9: Determination of elastic constants and deducing relation between Y , η and K .

B.Sc. I, Paper II- Electricity, Magnetism and electromagnetic theory

CO.1: Physical signification of gradient, divergence and curl of the scalar and Vector fields.

CO.2: To understand the uses of coulomb's law and gauss's law for electrostatics and properties of dielectric substances.

CO.3: To understand the concept of magnetism and electromagnetic induction such as self and mutual inductance.

CO.4: To determine the relation between current and voltage in LR, CR and LCR series and parallel resonance circuits.

CO.5: This course will enable the students to demonstrate a working understanding of capacitors.

CO.6: This course will enable the students to describe the magnetic field produced by magnetic dipoles and electric currents and explain Faraday-Lenz and Maxwell laws to articulate the relationship between electric and magnetic fields.

CO.7: This course will enable the students to apply various network theorems and their applications.

B.Sc. II, paper I Thermodynamics, Kinetic Theory and Statistical Physics

CO. 1: This course will enable the students to describe the basic concepts of laws of thermodynamics, the concept of entropy and the associated theorems, the thermodynamic potential and their physical interpretations.

CO. 2: Understanding the efficiency and properties of thermodynamic cycles of heat engines, refrigerator and heat pumps.

CO.3: This course will provide the students an understanding to describe about Maxwells' thermodynamic relations.

CO.4: Deducing relationships among the internal energy, enthalpy, heat capacities, entropy, and Gibb's and Helmholtz free energy. And able to calculate, these energy functions from equations of state and heat capacity data.

CO.5: This course will provide the students with an understanding to describe the basic concepts of gases, Maxwell-Boltzmann distribution law, equipartition of energies, mean free path of molecular collisions etc.

CO.6: This course will provide the students with an understanding to describe about the real gas equations, Vander Waal equation of state, the Joule-Thompson effect etc. Understanding the Maxwell's law of distribution of molecular speeds, experimental verification and transport phenomena in gases.

CO.7: An ability to understand the basics of low temperature and different experimental methods to produce low temperature and their applications.

CO.8: Familiarizing the in-depth knowledge about Wien's displacement, Rayleigh-Jean's laws, Planck's law in theory of radiation and measurement of radiation.

B.Sc. II, Paper II- Wave, Acoustics and Optics

CO.1: This course will provide the students an understanding to describe the principle of superposition of waves and the formation of standing waves.

CO.2: Exploring the defects in lenses by studying spherical aberration, chromatic aberration, coma and astigmatism.

CO.3: This course will provide the students with an understanding to apply basic knowledge of principles and theories about the behaviour of light and the physical environment to conduct experiments.

CO.4: This course will provide the students with an understanding to use the principle of waves and superposition to explain the physics of polarisation, interference and diffraction.

CO.5: Formation of spectra by grating and understanding the diffraction through single slit, double slit and N-slit.

CO.6: This course will provide the students with an understanding to describe the working of optical instruments like biprism, interferometer, diffraction grating, and holograms.

CO.7: This course will provide the students with knowledge to describe the spontaneous emission of radiation, optical pumping, and population inversion as well as Ruby laser and He- Ne laser.

CO.8: Understanding the communication through applications of holography.

B.Sc. III, Paper I- Relativity, Quantum Mechanics, Atomic Molecular and Nuclear Physics

CO.1: This course will provide the students with the knowledge to describe the main aspects and inadequacies of classical mechanics and understand historical development of quantum mechanics as well as its ability to discuss and interpret experiments that reveal the dual nature of matter.

CO.2: Describing the special theory of relativity postulates. Converting mass in to energy through Einstein relation.

CO.3: This course will provide the students with an understanding to describe the theory of wave measurements, wave packets and uncertainty principle.

CO.4: This course will provide the students with an understanding of the central concepts and principle of quantum mechanics, and the Schrodinger equations.

CO.5: This course will provide the students ability to describe the properties of nuclear structure of atomic nucleus.

CO.6: This course will provide the students with an understanding to know the fundamental of particle physics

CO.7: By observing dependence of atomic spectral lines on externally applied electric, magnetic fields and vector atom model.

CO.8: Understanding the basic ideas of nucleus with its liquid drop model, shell model and magic numbers.

B.Sc. III, Paper II- Solid state physics, Solid state Devices and electronics

CO. 1: This course will provide the students with knowledge to describe the crystalline and amorphous substances and understanding the x-ray diffraction in crystals and their applications.

CO.2: This course will provide the students with an understanding to describe the lattice vibrations, phonons and Einstein and Debye theory of specific heat of solids.

CO.3: This course will provide the students with knowledge to describe the band theory of solids and an understanding to differentiate insulators, conductors, and semiconductors.

CO.4: This course will provide the students with an understanding to describe the N- and P- type semiconductors, P-N junctions, application of PN junction for different type of rectifier and voltage regulators.

CO.5: This course will provide the students with knowledge to describe the PNP and NPN transistors and their applications as amplifiers and oscillators.

CO.6: To understand the fundamentals of digital electronics like conversion from binary to decimal and decimal to binary.

M.Sc. Physics, SEM-I (Paper- I Mathematical Physics)

CO.1 Understanding of Matrices, eigen values and eigen vectors

CO.2 Understanding of different theorems such as Cauchy - Riemann, Residue etc.

CO.3 Understanding of first and second order differential equation, and Green's functions

CO.4 Understanding of Legendre, Bessel, Hermite and Laguerre functions with their physical applications

CO.5 Concepts of Fourier transform, Laplace transform and Fourier series.

Paper II Classical Mechanics

CO.1 Understanding of mechanics of particle, equation of motion of particle and D'Alembert principle.

CO.2 Deduction of different Principle and equation from Hamilton variational principle.

CO.3 Capable to understand the applications of Hamilton equation of motion.

CO.4 Understanding of Hamilton - Jacobi differential equation and Poisson Bracket.

CO.5 Understanding of rigid body dynamics, Coriolis force and Euler's equation.

Paper III Electrodynamics and Plasma physics

CO.1 Capable to understand Maxwell's equation and wave propagation in different media

CO.2 Different phenomena related with wave propagation and boundary conditions

CO.3 Understanding of Einstein theory of special relativity and its covariant form

CO.4 Understanding of relativistic electrodynamics and radiation emitted by moving charges

CO.5 This course will provide the students with an understanding basic concepts of plasma and plasma kinetic theory

CO.6 Fundamentals of Hydrodynamics and magneto hydrodynamics

Paper IV-Electronics

CO.1 Study of different type of transistors.

CO.2 Understanding the working and characteristic of different phototransistors

CO.3 Detail study of operational amplifier

CO.4 Parameters related with practical of operational amplifier

CO.5 Understanding of different combinational logic circuits like adder, subtractor, coder, decoder multiplexer, demultiplexer and various gates like OR, AND, NOT, NAND, NOR etc.

CO.6 Understanding different sequential logic circuits like flip- flop, registers and counters

CO.7 Idea of digital to analogue and analogue to digital converters, basic idea of integrated circuits

CO.8 Understanding of memory, magnetic memory and networking in microprocessor.

CO.9 Understanding of Intel 8085 and time diagram.

CO.10 Understanding of instruction set of 8085 and addressing modes.

M.Sc. Physics (Sem II)- Quantum Mechanics-I

CO.1 Origin of Quantum theory and explanation of different phenomena on the basis of this theory, de-Broglie's hypothesis

CO.2 This course will enable the students to apply Schrodinger wave equation to various quantum situations like walls, barriers and harmonic oscillator

CO.3 The students will be able to normalize wavefunction and be able to determine expectation values.

CO.4 The course will enable the students to know fundamental concepts like operators, eigen functions, Dirac-delta function, Bra-Ket notation etc.

CO.5 Detailed spherically symmetric potentials i.e. study of hydrogen atom and its spectra on the basis of quantum mechanics

CO.6 This course will provide the students ability to understand Stark and Zeeman effect.

CO.7 Students will be able to understand the role of angular momentum in quantum mechanics.

Paper II- Statistical Mechanics

CO.1 Foundation of statistical mechanics, microstates, macrostates and theorems related with them

CO.2 Basic idea of ensemble theory

CO.3 Formulation of quantum statistics, theory of ideal gases and different statistics

CO.4 Ideal Bose and Fermi gases and their thermodynamics behaviour

CO.5 Understanding of Statistical Mechanics of interacting systems

Paper III -Electronics & photonic Devices and Optical Modulators

CO.1 The course will enable the students to know different bipolar devices, SCR, Diac and Triac, thyristors.

CO.2 Understanding of different transistors- JFET, MESFET, MOSFET, MOS, MIS, CCDs

CO.3 Understanding of various diodes- Tunnel diode, IMPATT diode, Gunn diodes

CO.4 Understanding of various photonic devices such as LEDs, Solar cells, photo diode

CO.5 The students will be able to know about optical modulators, electro-optic, magneto-optic and Acoustic-optic effect

CO.6 The students will be able to understand the basic concepts of Luminescence

Paper IV- Computational methods and programming

CO.1 Understanding of computational procedure and programming

CO.2 Understanding of different statements and different concept associated with different functions.

CO.3 Understanding of determination of zeros of linear, non-linear, algebraic equation and transcendental equations

CO.4 Understanding of numerical differentiation and Integration and Newton cote's formula

CO.5 Basic understanding of FORTRAN

Semester III Paper-I Quantum mechanics-II

CO.1 Different approximation methods to determine the energy States of hydrogen and Helium atoms

CO.2 Basic idea of scattering and its parameters

CO.3 Study of different particles on the basis of time dependent perturbation theory

CO.4 Understanding of relativistic quantum mechanics and its formulation

CO.5 Understanding of spin and angular momentum.

Paper-II Atomic and Molecular physics

CO.1 Understanding of Bohr theory of Hydrogen atom and Hydrogen like atom.

CO. 2 The students will be able to know spin -orbit coupling and hyperfine structures.

CO.3 Understanding of Zeeman effect, Paschen Back effect and Stark effect.

CO.4 Understanding of types of molecules and Rotational Spectra of diatomic molecules.

CO.5 Understanding of Vibrational spectra of diatomic molecules, vibrational Raman spectrum and Vibrational rotational Raman spectrum.

Paper-III SOLID STATE PHYSICS- I

CO.1 This course will provide the students ability to understand the theories and models for electron in solids and electronic properties

CO.2 It will provide the knowledge about effects and theory related with Fermi surfaces of metals

CO.3 The students will be able to understand the lattice dynamics of monoatomic, diatomic gases and thermal properties

CO.4 Understanding of electron-phonon interaction and superconductivity

CO.5 The students will be able know about the fundamentals of semiconductor crystals

Paper-IV Electronics (Communication)-I

CO.1 Understanding of Microwave devices such as Magnetron and travelling wave tubes

CO.2 Understanding of wave guides and components

CO.3 Understanding of Microwave cavities, transferred electron devices

CO.4 The students will be able to understand Radar systems and its working

CO.5 Understanding of satellite communication

Semester IV- Paper-I Nuclear and particle physics

CO.1 Understanding of Nucleon – Nucleon interaction and Nuclear forces and Yukawa interaction

CO.2 It will provide the knowledge about nuclear reactions and reaction energetics.

CO.3 Understanding of nuclear decay like Beta and Gamma decay and selection rules.

CO.4 Understanding of different nuclear model such as liquid drop, shell model etc.

CO.4 Understanding of basic concepts of elementary particle and Quark model

Paper- II Laser physics and application

CO.1 Basic idea of LASER and its parameters

CO.2 This course will enable the students to describe the different LASER systems

CO.3 The students will be able to understand the advances in laser physics

CO.4 Understanding of multi-phonon processes and Raman effect

CO.5 The students will be able to know the applications of laser Physics in different fields

Physics-III Solid State Physics-II

CO.1 This course will enable the students to understanding of Plasmons and Polaritons

CO.2 The students will be able to understand the Maxwell's equations for dielectric and ferroelectrics.

CO.3 General idea of dia, para magnetism and different theories for them.

CO.4 Understanding of Ferromagnetism and anti-ferromagnetism

CO.5 Basic understanding of optical processes, excitons and various defects.

Physics-IV Electronics -II (Communication)


CO.1 The students will be able to understand fundamentals of digital communication.

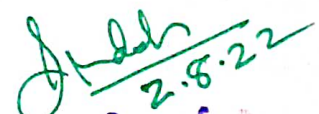
CO.2 Understanding of digital modulation techniques

CO.3 The course will enable the students to understand noise and its mathematical representation.

CO.4 Understanding of data transmission in terms of PSK, FSK etc.

CO.5 Understanding of data transmission specific to noise in pulse code and delta modulation system


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2.8.22
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