R. L. S. Y. COLLEGE, KOKAR, RANCHI
DEPARTMENT OF PHYSICS

COURSE OUTCOMES FOR BSc PHYSICS (HONS)

The course outcomes of the different papers offered are presented below. After completion of the course the student will be able to:

Course Code	Course Title	Credits	Course Outcomes
CC1	Mathematical Physics - I	(4+2)	After successful completion of the course, the student is expected to: CO1:- Learn and understand calculus. Starting with review of differentiation, exponential and logarithm functions, trigonometric functions, plotting functions, differentials and basics of integration. CO2:- Understand Gaussian integrals, integration by parts, differential and integral calculus for many variables, Lagrange multipliers and Jacobins, Taylor series and their applications in physics. CO3:- Understand complex number and application of Cauchy-Riemann Equations, Residue Theorem and Taylor Series for analytic functions. CO4:- Understand basics of vector calculus. CO5:- Understand divergence, gradient and curl and their physical interpretation. CO6:- Understand divergence theorem, Green's theorem, Stokes' theorem and appreciate its applications. CO7:- Understand basics of matrices and determinants i.e. inverses, linear vector spaces, basis, transformations and linear operators, determinants, eigenvalues, eigenvectors, simple applications, and basics of tensors. CO8:- Understand differential equations i.e. ordinary differential equations with constant coefficients, first order ODE's with variable coefficients, second order ODE's partial differential equations, the wave equation and the heat equation, and application of Green's function.
CC2	Mechanics	(4+2)	On successful completion of the course students will be able to: CO1:- Learn fundamentals of dynamics frame of reference, laws of motion, centre of mass and rotational dynamics. CO2:- Learned conservation laws of energy and linear and angular momentum and apply them to solve problems. CO3:- Learn the surface tension, central forces and Kepler's laws. CO4:- Familiarise with Lagrangian and Hamiltonian formulations of classical mechanics. CO5:- Fundamental ideas of special theory of relativity such as length contraction and time dilation and mass –energy invariance.
C1+C2 Lab	Physics Practical		

Course Code	Course Title	Credits	Course Outcomes
CC 3	Electricity and Magnetism	(4+2)	After successful completion of the course, the student is expected to: CO1:- Understand the basic concepts of electric and magnetic fields. CO2:- Understand the concept of conductors, dielectrics, inductance and capacitance. CO3:- Gain knowledge on the nature of magnetic materials. CO4:- Understand the concept of static and time varying fields. CO5: Gain knowledge on electromagnetic induction and its applications. CO6:- Gain knowledge on EM waves, propagation and their properties. CO7:- Ability to use Maxwell's equations in calculations featuring: both free and stationary electromagnetic waves.
CC 4	Waves and Optics	(4+2)	After successful completion of the course, the student is expected to CO1:- Understand the concepts of light wave and its equation, meaning of coherence, interference, fringes, interference by Fresnel's biprism, Newton's rings etc. CO2:- Learn the fundamentals of harmonic oscillator, including damped and forced oscillators and grasp the significance of terms like quality factor and damping coefficient. CO3:- Learn from the diffraction about various types diffractions in details, knowledge of grating and its resolving power. CO4:- Understanding the wave equation , phase velocity, group velocity and their relation between them.
C3+ C4 Lab	Physics Practical		

Course Code	Course Title	Credits	Course Outcomes

CC 5	Mathematical Physics- II	(4+2)	After successful completion of the course, the student is expected to: CO1:- Understand the basic elements of signals and linear time-invariant systems, including the complex exponential and sinusoidal signals, unit step function and unit impulse function (Dirac delta function), discrete time unit step and unit impulse sequences, continuous and discrete time system, linear time invariant (LTI) systems, continuous time LTI systems, and properties of LTI systems. CO2:- Ability to solve ordinary second order differential equations important in the physical sciences. CO3:- Understand how to expand a function in a Fourier series, and under what conditions such an expansion is valid. CO4:- Understand Fourier analysis of continuous-time signals and systems. CO5:- Understand frequency and time domain characteristics system. CO6:- Understand sampling and reconstruction of signal.
CC 6	Thermal Physics	(4+2)	After successful completion of the course, the student is expected to CO1:- Become familiar with various thermodynamic process and work done in each of these process . CO2:- Have a clear understanding about Reversible and irreversible process and also working of a Carnot engine, and knowledge of calculating change in entropy for various process. CO3:- Realize the importance of Thermodynamical functions and applications of Maxwell's relations. CO4:- Familiarize in depth about statistical distribution and have basic Ideas about Maxwell- Boltzmann, Bose-Einstein and Fermi Dirac Statistics and their applications.
CC 7	Digital Systems and Applications	(4+2)	After successful completion of the course, the student is expected to CO1:- Understanding the difference between digital and analog systems. CO2:- Understand number of systems and Boolean algebra. CO3:- Appreciate the working an of flip-flop, registers, counters. CO4:- Understanding the monostable and astable multivibrator. CO5:- Learn how to construct and draw logic circuits like NOT, AND, OR, NAND, AND NOR Gates etc.
C5+C6 +C7	Physics Practical		

Course Code	Course Title	Credits	Course Outcomes
CC 8	Mathematical Physics-III	(4+2)	After successful completion of the course, the student is expected to CO1:- Understand the basic elements of signals and linear time-invariant systems, including the complex exponential and sinusoidal signals, unit step function and unit impulse function

			(Dirac delta function), discrete time unit step and unit impulse sequences, continuous and discrete time system, linear time invariant (LTI) systems, continuous time LTI systems, and properties of LTI systems. CO2:- To understand the solving of complex analysis.
CC 9	Elements of Modern Physics	(4+2)	After successful completion of the course, the student is expected to: CO1:-Understand the intuitive of the relativity and quantum physics. CO2:- They will know about the problems confronting modern physics in the 21th century. CO3:- Understand the origins of quantum mechanics. CO4:- Understand the idea of wave functions. CO5:-Understand the uncertainty relations. CO6:- Develop the idea of spin and quantum statistical mechamics.
CC 10	Analog Systems and Applications	(4+2)	After successful completion of the course, the students will be able to: CO1:- Have a basic knowledge of semiconductor physics. CO2:- Acquire knowledge about how a semiconductor diode rectifies an input ac signal. CO3:- Learn how to construct a transistor amplifier and how its gain varies with frequency. CO4:- Discuss basic idea of doping , p-n junction diode and its V-I characteristics using graphical and mathematical methods.
C8+C9 +C10 Lab	Physics Practical		

Course Code	Course Title	Credits	Course Outcomes
CC 11	Quantum Mechanics and Applications	(4+2)	After successful completion of the course, the student is expected to: CO1:- Pinpoint the historical aspects of development of quantum mechanics. CO2:- Understand and explain the difference between classical and quantum mechanics. CO3:- To become familiar with Blackbody radiation, Ultraviolet, Photo-Electric effect and Compton Effect and hence be aware how quantum theory emerged. CO4:- Understand the idea of wave function. CO5:- Understand the uncertainty relations. CO6:-Understand the concept of eigen values, eigen functions and learn the basic postulates of quantum mechanics. CO7:- Solve Schrodinger equation for simple potentials.

CC1 2	Solid State Physics	(4+2)	After successful , completion of the course, the student will be able to : CO1:-To analyze different types of the matter depending on nature of chemical bonds and their properties. CO2:- To analyze the crystal structures by applying crystallographic parameters. CO3:-To determine the crystal structure by analysis of XRD data. CO4:-To analyze the lattice vibration phenomenon in the solids. CO5:-Describe the effect of doping on the electronic properties of semiconductors. CO6:- To analyze electron transport and energy related problems by applying quantum mechanical principles.
DSE1	Nuclear and Particle Physics	(5+1)	After successful completion of the course, the student is expected to : CO1:- Demonstrate knowledge of fundamental aspects of the structure of the nucleus, radioactive reactions and the interaction of radiation and matter. CO2:- Have a deep knowledge about Radio activity, nuclear Fission and Nuclear Fusion, the relevance of nuclear transformation. CO3:- Understand the working of nuclear detectors and counters, realize the importance of Cosmic rays and its effects on earth CO4:- Discuss nuclear and radiation physics applications in medical diagnostics and therapy, energetics , geology, archaeology. CO5:-Students are able to understand the detecting methods and instruments for different type of charged and neutral particles. CO6:-They are able to understand the size of nucleus and all its properties.
DSE2	Classical Dynamics	(5+1)	After successful, completion of the course, the student will be able to: CO1:- Understand important topics of classical dynamics including relativity. CO2:- Further develop critical thinking and program skills. CO3:- Conduct physics research on a better foundation.
C11+ C12 Lab	Physics Practical		

Course Code	Course Title	Credits	Course Outcomes

CC 13	Electromagnetic Theory	(4+2)	After successful , completion of the course, the student will be able to : CO1:- Understand the basic mathematical concepts related to electromagnetic vector fields. CO3:- Understand apply Maxwell's equations to solutions of problems relating to transmission lines and uniform plane wave propagations. CO4:- Analyze the nature of electromagnetic wave propagation in guided medium which are used in microwave applications. CO5:- Apply the principle of electrostatics to the solutions of problems relating to electric field and electric potential, boundary conditions and electric energy density. CO6:- Ability to define and derive expressions for the energy both for the electrostatic and magnetostatic fields, and derive Poynting theorem from Maxwell's equations and physical interpret. CO7:- Ability to describe and make calculations of plane electromagnetic waves in homogeneous media, including reflexion of such waves in plane boundaries between homogeneous media. CO8:- Understand the concepts related to faraday's law, induced emf and Maxwell's equations.
CC 14	Statistics Mechanics	(4+2)	Upon successful, completion of the course, the student will have achieved the ability to : CO1:- Find the connection between statistics and thermodynamics. CO2:- differentiate between different ensemble theories used to explain the behavior of the systems. CO3:- Differentiate between classical statistics and quantum statistics. CO4:-Explain the statistical behavior of ideal Bose and Fermi systems.
DSE 3	Dissertation	(5+1)	Project
DSE 4	Experimental Techniques	(5+1)	After successful, completion of the course, the student will be able to: CO1:- Learn the measurements of accuracy and precision, significant figures, error and uncertainty analysis. CO2:- Understanding the signals and systems and as well as shielding and grounding. CO3:- Understand the transducers and industrial instrumentation(working principle, efficiency and their applications). CO4:- Understanding how to use and measure the digital multi meter.

DEPARTMENT OF PHYSICS
PROGRAMME OUTCOMES

Undergraduate course in Physics Would provide following opportunities.

■ To understand the basic laws and explore the fundamental concepts of physics.

□ To understand fundamental concepts and significance of the various physical phenomena.

■ To carry out experiments to understand and explore the laws and concepts of Physics.

□This course introduces students to the methods of experimental physics, apply the theories learnt and the skills acquired to solve real time problems.

■ To enhance good communication skill such that they can explain complicated physics technical terminologies in simple manner and will be will be able to retrieve information from e-libraries and other e-sources from internet.

□ To motivate the students to pursue PG courses and research work in reputed institutions.

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