Department of Physics
Govt. Autonomous College, Rourkela

Program outcome

PO1: Apply knowledge of mathematics, science and engineering fundamentals and develop skills to learn new technology.

PO2: Identify, formulate, research literature and learn concepts of physics.

PO3: Function effectively as an individual, and as a member or leader in diverse teams and in multi-disciplinary settings.

PO4: Students will participate and succeed in competitive examinations for PG programs& Govt. services.

Program Specific Outcome

PSO1: Demonstrate knowledge and understanding among students.

PSO2: Apply ethical principles and commit to professional ethics and responsibilities.

PSO3: Recognize the need for and have the preparation and ability to engage in independent and life- long learning.

PSO4: Communicate effectively with society at large, such as being able to comprehend and write effective reports and design documentation, make effective presentations and give and receive clear instructions.

PSO5: Apply contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to professional practice.

BSC PHYSICS

SEMESTER I:

Core 1: MATHEMATICAL PHYSICS-I: Calculus, Vector Algebra, Orthogonal Coordinates, Dirac delta function, Vector Differentiation and Integration.

Core 2: MECHANICS: Rotational dynamics, Non-inertial systems, Elasticity, Fluid Motion, Gravitation and Central Force Motion, Oscillation, Special Theory of Relativity.

SEMESTER II:

Core 3: ELECTRICITY AND MAGNETISM: Electric field and potential, Magnetic field, Dielectric properties, Electromagnetic induction, Electrical circuit and Network Theorem.

Core 4: WAVES AND OPTICS: Geometrical Optics, Wave motion, Interference, Fraunhofer Diffraction

SEMESTER III:

Core 5: MATHEMATICAL PHYSICS-II: Fourier series, Frobenius method, Polynomials, Partial Differential equations

Core 6: THERMAL PHYSICS: Introduction to thermodynamics and law of Thermodynamics, Entropy, Thermodynamic Potentials, Maxwell's Thermodynamic relations, Kinetic Theory of Gases, Real Gases.

Core 7: DIGITAL SYSTEMS AND APPLICATION: Integrated circuits, Digital circuits, Boolean Algebra, Introduction to CRO, Data processing circuits, Arithmetic circuits, Timers, Shift Registers, Counters

SEMESTER IV:

Core 8: MATHEMATICAL PHYSICS-III: Complex Analysis, Integral Transforms, Application of Fourier transforms, Laplace transforms, Derivatives and integrals of Laplace Transforms.

Core 9: ELEMENTS OF MODERN PHYSICS: Atomic spectra and models, Bohr Theory, Wave-particle Duality, Heisenberg Uncertainity Principle, Nuclear Physics, Fission and Fusion.

Core 10: ANALOG SYSTEM AND APPLICATIONS: Semiconductor diodes, two-terminal devices, types of diodes, BJT, Amplifiers, Coupled amplifiers, Feedback in amplifiers, OP-AMPS and application.

SEMESTER V:

Core 11: QUANTUM MECHANICS AND APPLICATIONS: Schrodinger equation and operators, Time-independent Schrodinger equation, Bound states in arbitrary potential, one-dimensional rigid box, atoms in electric and magnetic fields and external magnetic fields.

Core 12: SOLID STATE PHYSICS: Crystal structure, Lattice dynamics, Magnetic properties of matter, dielectric properties of matter, band theory, LASERS, Superconductivity.

DSE 1: CLASSICAL DYNAMICS: Classical mechanics of point particles, Hamiltonian, Small oscillation and canonical transformation, Special Theory of relativity.

DSE 2: NUCLEAR AND PARTICLE PHYSICS: General properties of nuclei, Nuclear models, Radioactivity decay, Nuclear reactions, Detector of Nuclear radiations, Particle accelerator, Particle physics.

SEMESTER VI:

Core 13: ELECTROMAGNETIC THEORY: Maxwell's equation, EM waves in bounded and unbounded media, Optical fibers and polarization of EM waves.

Core 14: STATISTICAL MECHANICS: Classical Statistics and Thermodynamic functions, Radiation, Quantum statistics.

DSE 3: NANO MATERIAL AND APPLICATIONS: Nanoscale systems, Synthesis of Nanostructure Materials, Characterization, Applications.

DSE 4: DISSERTION AND PROJECT

MSc PHYSICS

SEMESTER I:

PHY 101:CLASSICAL MECHANICS: Lagrangian Formulation,Hamiltonian Formulation, Cononical Transformations,Hamilton Jacobi Theory, Small Oscillation, Rigid Body Dynamics

PHY 102:MATHEMATICAL METHODS OF PHYSICS: Complex variables, General Tensor Analysis, Differential equations and their solutions, Laguerre Differential equation and it's solution.

PHY 103: QUANTUM MECHANICS-I: General Principles of quantum mechanics, Quantum Dynamics, Rotational and Orbital Angular Momentum, Motion in spherically symmetric field.

PHY 104: GROUP THEORY AND COMPUTATIONAL PHYSICS: Group Theory, Introduction to FORTRAN, Control Statements.

PHY 105: MODERN PHYSICS AND OPTICS LAB

SEMESTER II:

PHY 201: QUANTUM MECHANICS-II: Approximation Methods for Stationary States, Variational Methods, WKB Approximation Method, Time Dependant Perturbation Theory, Scattering Theory.

PHY 202: THERMAL AND STATISTICAL PHYSICS: Laws of Thermodynamics, Classical Statistical Mechanics, Quantum Statistical Mechanics, Phase Transition.

PHY 203: BASIC SOLID STATE PHYSICS: Crystal binding, Semiconductors, Dielectrics, Superconductivity

PHY 204: BASIC ELECTRONICS: Network theory, Amplifiers, Operational Amplifiers, Oscillators, Digital Electronics

PHY 205: FORTRAN LAB

SEMESTER II:

PHY 301: ATOMIC AND MOLECULAR PHYSICS: X-Ray spectra, Atomic spectra, Alkali spectra, Molecular spectra, LASER

PHY 302: NANO MATERIAL AND APPLICATIONS: Nanoscale systems, Synthesis of Nanostructure Materials, Characterization, Applications

PHY 303: CLASSICAL ELECTRODYNAMICS: Maxwell's equations, Conservation laws and Electromagnetic Potentials, Propagation of Plane Electromagnetic waves and polarization, Dispersion, Radiation and scattering

PHY 304: ELECTRONICS (SPECIAL PAPER-I): p-n junction, Metal semiconductor junction, BJT, JFET, Special Devices

PHY 305: ELECTRONICS LAB-I

SEMESTER IV:

PHY 401: NUCLEAR AND PARTICLE PHYSICS: Nuclear size and shape, Nuclear models, Two-Nucleon Problem, Nuclear Force, Nuclear Reaction, Particle Physics:

PHY 402: FIELD THEORY: Relativistic notation, Free Klein-Gordon field Theory, Dirac Equation, Maxwell's equation

PHY 403: ELECTRONICS (SPECIAL PAPER-II): Application of OP-AMPS, Logic families, Application of Flip Flops, Analog modulation, Digital Modulation, Ionosphere Communication, Antenna

PHY 404: INTRODUCTION TO ASTROPHYSICS: Celestial mechanics, Instruments and Photometric Concepts, The solar system, Stars and Sun, Galaxies and the milky-way.

PHY 405: ELECTRONICS LAB-II

PHY 406: DISSERTION AND PROJECT