# CO & PO of Physics

| Course code | Course Name | Year of introduction | Course Outcome | Programme Outcome |
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| **PHSHCC1T** | MATHEMATICAL PHYSICS-I | 2017-2018 | The course provides basic knowledge of mathematical physics. | After the course students clear their concept on Calculus, Vector Calculus, Orthogonal Curvilinear Coordinates, Introduction to probability, Dirac-Delta function and its properties |
| **PHSHCC1P** | MATHEMATICAL PHYSICS-I LAB | 2017-2018 | This mathematical physics lab provides basic knowledge on computational skills. | After the course students clear their concept on Basics of scientific computing, Errors and error Analysis in different methods, plotting graphs with Gnuplot, programming in python:, help to study the higher education, research level. |
| **PHSHCC2T** | MECHANICS | 2017-2018 | The course deals with fundamentals of Mechanics. | After the course students clear their concept on Fundamentals of Dynamics, Work and Energy, Collisions, Rotational Dynamics, Elasticity, Fluid Motion, Gravitation and Central Force Motion, Oscillations, Non-Inertial Systems, Special Theory of Relativity |
| **PHSHCC2P** | MECHANICS LAB | 2017-2018 | This course deals with basic mechanics lab. | After the course students clear their concept on some different experiments on mechanics related to the theoretical concept |
| **PHSHCC3T** | ELECTRICITY ANG MAGNETISM | 2017-2018 | The course improves basic knowledge and understanding on electricity and magnetism. | After the course students clear their concept on Electric Field and Electric Potential, Dielectric Properties of Matter, Magnetic Field, Magnetic Properties of Matter, Electromagnetic Induction, Electrical Circuits, Network theorems |
| **PHSHCC3P** | ELECTRICITY ANG MAGNETISM LAB | 2017-2018 | This course enhance experimental skills on electricity and magnetism. | After the course students clear their concept on fundamental characteristic of electric component, electric circuit and their related theorem physically. |
| **PHSHCC4P** | WAVE AND OPTICS | 2017-2018 | The course deals with the basics of wave and optics. | After the course students clear their concept on Superposition of Collinear Harmonic oscillations, Superposition of two perpendicular Harmonic Oscillations, Wave Motion, Velocity of Waves, Superposition of Two Harmonic Waves, Wave Optics, Interference, Interferometer, Diffraction and Holography |
| **PHSHCC4T** | WAVE AND OPTICS LAB | 2017-2018 | This course improves the knowledge on optical experiments. | After the course students clear their concept on Wavelength measurement in different techniques using ordinary instruments and optical property determination of market available glass materials. |
| **PHSHCC5T** | MATHEMATICAL PHYSICS- II | 2018-2019 | This course provides more knowledge about mathematical physics. | After the course students clear their concept on Fourier Series, Frobenius Method and Special Functions, Some Special Integrals, Variational calculus in physics, Partial Differential Equations |
| **PHSHCC5P** | MATHEMATICAL PHYSICS- II LAB | 2018-2019 | This mathematical physics lab provides more knowledge on computation. | After the course students clear their concept on Numerical computation using numpy and scipy, Curve fitting, Least square fit, Goodness of fit, standard deviation, Generation of Special functions using User defined functions, Solution of ODE First order Differential equation Euler, modified Euler and Runge-Kutta second order methods Second order differential equation Fixed difference method |
| **PHSHCC6T** | THERMAL PHYSICS | 2018-2019 | The thermal physics course provides detail knowledge on the subject . | After the course students clear their concept on fundamental Thermodynamics, epsicially gasses system |
| **PHSHCC6P** | THERMAL PHYSICS LAB | 2018-2019 | This course enhance experimental skills on thermal physics. | After the course students clear their concept on Measurement of Thermal Conductivity and Temperature Coefficient of Resistance in different methods, characteristic of Thermocouple measurement by electrical and non-electrical methods. |
| **PHSHCC7T** | DIGITAL SYSTEMS AND APPLICATIONS | 2018-2019 | This course provides knowledge on digital systems and applications. | After the course students clear their concept on Integrated Circuits, Digital Circuits, Boolean algebra, Data processing circuits, Circuits, Timers, Shift registers, Counters (4 bits), Computer Organization |
| **PHSHCC7P** | DIGITAL SYSTEMS AND APPLICATIONS LAB | 2018-2019 | This is a course deals with digital systems and applications lab. | After the course students clear their concept on use of CRO, Multimeter, AND, OR, NOT and XOR, NAND gates, binary Adder, different types of Flip-Flop, 555 Timer and their applications. |
| **PHSHSEC1** | COMPUTATIONAL PHYSICS OR BASIC INSTRUMENT SKILL OR RENEWABLE ENERGY & ENERGY HARVESTING OR APPLIED OPTICS | 2018-2019 | The skill enhancement course improves both theoretical and practical skills and knowledge on the concerned subject. | Basic Electricity Principles, Understanding Electrical Circuits, Electrical Drawing and Symbols, Generators and Transformers, Electric Motors, Solid-State Devices, Electrical Protection, Electrical Wiring |
| **PHSHCC8T** | MATHEMATICAL PHYSICS-III | 2018-2019 | The course deals with detail knowledge on mathematical physics. | After the course students clear their concept on Complex Analysis, Integrals Transforms, Matrices, Eigen-values and Eigenvectors. |
| **PHSHCC8P** | MATHEMATICAL PHYSICS- III LAB | 2018-2019 | The course is on mathematical physics lab. | After the course students clear their concept on Mathematical calculation and problem solutions, like Differential equations solution, Dirac Delta Function, Fourier Series, Frobenius method and Special functions, Error & least square fitting Calculation, Evaluation of trigonometric functions, Compute the nth roots of unity, Integral transform by computer programming. |
| **PHSHCC9T** | ELEMENTS OF MODERN PHYSICS | 2018-2019 | This course provides knowledge on elements on modern physics. | After the course students clear their concept on Basic concept of Quantum mechanics, Position measurement (quantum level) experiments, Two slit interference experiment, Radioactivity |

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| | | | | Fission and fusion Lasers. |
| **PHSHCC9P** | ELEMENTS OF MODERN PHYSICS LAB | 2018-2019 | The course is on elements of modern physics lab. | After the course students clear their concept on some experiments, related to the PHSHCC9T courses. |
| **PHSHCC10T** | ANALOG SYSTEMS AND APPLICATIONS | 2018-2019 | The course deals with analog systems and applications. | After the course students clear their concept on Semiconductor Devices, like Two-terminal Devices, BJT, FET, Amplifiers, Coupled Amplifier, Feedback in Amplifiers, Sinusoidal Oscillators, Operational Amplifiers (Black Box approach), Applications of Op-Amps, Conversion (D/A and vice versa) |
| **PHSHCC10P** | ANALOG SYSTEMS AND APPLICATIONS LAB | 2018-2019 | This is a course on analog systems and application lab. | After the course students clear their concept on Semiconductor Devices, different types of amplifier, oscillators, OPAMP and convertor (D/A & A/D) |
| **PHSHSEC2** | COMPUTATIONAL PHYSICS OR BASIC INSTRUMENT SKILL OR RENEWABLE ENERGY & ENERGY HARVESTING OR APPLIED OPTICS | 2018-2019 | The skill enhancement course improves both theoretical and practical skills and knowledge on the concerned subject. | After the course students clear their concept on (i) Computational Physics, like Usage of linux Development of FORTRAN TeX/LaTeX word processor Visualization graphical analysis and its limitations Introduction to Gnuplot, (ii) Basic of Measurement Electronic Voltmeter, Cathode Ray Oscilloscope, Signal Generators and Analysis Instruments Impedance Bridges & Q-Meters, Digital Instruments, Digital Multimeter (iii) Fossil fuels and Alternate Sources of energy, like Solar energy, Wind Energy, harvesting Ocean Energy, Geothermal Energy, Hydro Energy, Piezoelectric Energy, harvesting Electromagnetic Energy Harvesting (iv) Applied Optics: Sources and Detectors Fourier Optics Holography Photonics: Fibre Optics |
| **PHSHCC11T** | QUANTUM MECHANICS AND APPLICATIONS | 2019-2020 | The course provides knowledge on quantum mechanics and applications. | After the course students clear their concept on Schrodinger equation General discussion of bound states in an arbitrary potential Quantum theory of hydrogen-like atoms Atoms in Electric & Magnetic Fields Atoms in External Magnetic Fields Many electron atoms |
| **PHSHCC11P** | QUANTUM MECHANICS AND APPLICATIONS LAB | 2019-2020 | This is a computational course based on quantum mechanics and applications. | After the course students clear their concept on solution of Schrodinger equationin different cases, determine magnetic field as a function of the resonance frequency, Zeeman effect tunneling effect, Quantum efficiency of CCDs |
| **PHSHCC12T** | SOLID STATE PHYSICS | 2019-2020 | The course provides basic knowledge on solid state physics. | After the course students clear their concept on Crystal Structure, Elementary Lattice Dynamics, Magnetic Properties of Matter, Dielectric Properties of Materials, Ferro electric Properties of Materials, Elementary band theory, Superconductivity |
| **PHSHCC12P** | SOLID STATE PHYSICS LAB | 2019-2020 | This is a course on solid state physics lab. | After the course students clear their concept on some important experiments, theoretical studies in PHSHCC-12 course |
| **PHSHDSE1** | ADVANCED MATHEMATICAL PHYSICS- I | 2019-2020 | The course deals with both theoretical and computational advanced mathematical physics-I. | After the course students clear their concept on Classical Mechanics of Point Particles Small Amplitude Oscillations Special Theory of Relativity Fluid Dynamics |
| **PHSHDSE2** | NUCLEAR AND PARTICLE PHYSICS | 2019-2020 | The course provides knowledge on nuclear and particle physics. | After the course students clear their concept on General Properties of Nuclei Nuclear Models Radioactivity decay Nuclear Reactions Interaction of Nuclear Radiation with matter Detector for Nuclear Radiations Particle Accelerators Particle physics |
| **PHSHCC13T** | ELECTROMAGNETIC THEORY | 2019-2020 | The course deals with electromagnetic theory. | After the course students clear their concept on Maxwell Equations EM Wave Propagation in Unbounded Media EM Wave in Bounded Media Polarization of Electromagnetic Waves Wave guides Optical Fibres |
| **PHSHCC13P** | ELECTROMAGNETIC THEORY LAB | 2019-2020 | This course provides knowledge on electromagnetic theory lab. | After the course students clear their concept on Optical properties of different materials measurements in different techniques, theoretical studies in PHSHCC-13 |
| **PHSHCC14T** | STATISTICAL PHYSICS | 2019-2020 | The course deals with basic statistical mechanics. | After the course students clear their concept on Classical Statistical Mechanics, Classical Theory of Radiation, Quantum Theory of Radiation, Bose-Einstein Statistics, And Fermi-Dirac Statistics and their applications. |
| **PHSHCC14P** | STATISTICAL PHYSICS LAB | 2019-2020 | This is a computational course based on statistical mechanics. | After the course students clear their concept on some theoretical calculation based on PHSHCC-14 courses using computer programmed. |
| **PHSHDSE3** | COMMUNICATION ELECTRONICS | 2019-2020 | This course provides basic knowledge on Communication Electronics and also its application | After the course students clear their concept on Electronic communication Analog Modulation Analog Pulse Modulation Digital Pulse Modulation Introduction to Communication and Navigation systems Satellite Communication Mobile Telephony System |
| **PHSHDSE4** | EXPERIMENTAL TECHNIQUES | 2019-2020 | This course enhance the knowledge on experimental techniques. | After the course students clear their concept on Measurements Signals and Systems Shielding and Grounding Transducers &industrial instrumentation (working principle, efficiency, applications) Digital Multimeter Impedance Bridges and Q-meter Vacuum Systems |

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| **PHSHGE1T** | ELEMENTS OF MODERN PHYSICS | 2017-2018 | Students are able to learn the various aspect of modern physics. | After the course students clear their concept on Planck's quantum, Problems with Rutherford model, Position measurement, Two slit interference experiment, One Dimensional infinitely Rigid Box, Size and structure of atomic nucleus and its relation with atomic weight, Radioactivity, Fission and fusion. |
| **PHSHGE1P** | ELEMENTS OF MODERN PHYSICS LAB | 2017-2018 | This course improves experimental knowledge on modern physics. | After the course students clear their concept on Experimental verification of some theory and some universal constants, studied in PHSHGE-1T course |
| **PHSHGE2T** | THERMAL PHYSICS AND STATISTICAL MECHANICS | 2017-2018 | Gain knowledge on basics of thermal physics and its connection to statistical mechanics | After the course students clear their concept on Laws of Thermodynamics, Thermo dynamical Potentials, Kinetic Theory of Gases, Theory of Radiation, Statistical Mechanics |
| **PHSHGE2P** | THERMAL PHYSICS AND STATISTICAL MECHANICS LAB | 2017-2018 | This course enhance the experimental skills on thermal physics and statistical mechanics. | After the course students clear their concept on Experimental verification of some universal constants, like Mechanical Equivalent of Heat, Planck's constant, Stefan's Constant, coefficient of thermal conductivity, temperature co-efficient of resistance thermo emf across two junctions of a thermocouple and related experiments. |
| **PHSHGE3T** | SOLID STATE PHYSICS | 2018-2019 | Students will gain knowledge on solid state physics. | After the course students clear their concept on Crystal Structure, Elementary Lattice Dynamics, Magnetic Properties of Matter, Dielectric Properties of Materials, Elementary band theory, Superconductivity. |
| **PHSHGE3P** | SOLID STATE PHYSICS LAB | 2018-2019 | This is a course on experimental technique based on solid state physics. | After the course students clear their concept on Experimentally determination of magnetic, electric properties, like, susceptibility, Coupling Coefficient of a piezoelectric crystal, Dielectric Constant, refractive index, PE & BH Hysteresis loss, band gap determine the Hall coefficient of a semiconductor sample in different techniques. |
| **PHSHGE4T** | ELECTRICITY AND MAGNETISM | 2018-2019 | This course enhance the understanding on electricity and magnetism. | After the course students clear their concept on Digital Circuits Semiconductor Devices and Amplifiers Operational Amplifiers (Black Box approach) Instrumentations. |
| **PHSHGE4P** | ELECTRICITY AND MAGNETISM LAB | 2018-2019 | The course provides experimental knowledge on electricity and magnetism. | After the course students clear their concept on Semiconductor Devices, like Two-terminal Devices, BJT, FET, Amplifiers, Coupled Amplifier, Feedback in Amplifiers, Sinusoidal Oscillators, Operational Amplifiers (Black Box approach), Applications of Op-Amps, Conversion (D/A and vice versa) |