Deccan Education Society's

Fergusson College (Autonomous), Pune

Program Specific Outcomes(PSOs) and Course Outcomes (COs) 2019-20

Department of Physics

Programme: B. Sc. Physics

PSO No.	Program Specific Outcomes(PSOs) Upon completion of this programme the student will be able to
PSO1	**Academic competence** (i) Develop and demonstrate an understanding of the concepts related to heat, thermodynamic laws, electric field due to static charge distribution, Newtonian mechanics, wave properties of light, Newtonian mechanics, inertial and non-inertial frames of reference, radioactivity, elementary particles, quark model, physical systems from nano-scale to macroscopic scale, magnetostatics, Maxwell's equations and plane wave generation and quantum mechanical systems. Associate the fundamental concepts in physics and interpret information. (ii) Demonstrate independent thinking and scientific temper. Categorize, calculate and solve problems using concepts of physics.
PSO2	**Personal and Professional Competence** (i) Carry out laboratory-oriented numerical calculations and be capable in data visualization and interpretation. Perform, demonstrate and analyse experimental work with suitable techniques in physics to study the phenomena related to light, scientific instruments, material process, electrical and electronics applications. (ii) Carry out the calculations in classical mechanics, quantum mechanics, mathematical methods and solids with advance techniques using computations and C-programming. (iii) Analyse experimental results and interpret graphs. (iv) Formulation of ideas, scientific writing and authentic reporting, effective presentation and communication skills through group discussion.
PSO3	**Research Competence** (i) Apply Physics concepts of thermodynamics, mechanics, wave optics, electronics and nuclear physics in day to day life. Integrate core concepts studied in materials science, electronics, and optics during experimentations and projects. (ii) Integrate and explore techniques of synthesis, characterization of different materials and techniques of astronomical data analysis. Cultivate concepts of

	measurement techniques in physics and relate physics concepts in day to day life. (iii) Integrate core physics subjects during experimentation and projects. (iv) Apply numerical methods to solve various complex physical problems. (v) Identify and interpret research literature, formulate ideas, write reports and review articles related to all subjects in physics.
PSO4	**Entrepreneurial and Social competence** Enhance and empower the students with their self-reliance capabilities through the understanding of advance techniques, use of programming language, material processing, mathematical and classical concepts, advancement of electronics ideas with reference to advance techniques with their industrial applications. (i) Employ experimental skills in industrial applications. (ii) Develop scientific temperament and social awareness through internships and science popularization. Awareness of ethical issues: emphasis on academic and research ethics. (iii) Outline the use of renewable sources for sustainable development of human beings. (iv) Execute social competence including effective use of computer languages to meet global competencies in technological world.

F.Y. B.Sc. Semester I		
Title of the Course and Course Code	**Mechanics and Properties of matter (PHY1101)**	**Number of Credits : 02**
On completion of the course, the students will be able to:		**Bloom's Cognitive level**
CO1	Identify fundamental principles in mechanics.	1
CO2	Illustrate Newton's laws of gravitation and Kepler's laws of planetary motion. Explain viscosity of Fluid, law of energy conservation and applications of Bernoulli's theorems with examples.	2
CO3	Apply the physical principles of moment of inertia in terms of the mass distribution from the rotational axis to various symmetrical bodies.	3
CO4	Analyse the properties and applications of elasticity with experiments.	4
CO5	Justify the quantitative problem-solving skills in all the topics covered.	5
CO6	Develop an intuition towards problems solving and design realistic applications in the physical world.	6
Title of the Course and Course Code	**Heat and Thermodynamics (PHY1102)**	**Number of Credits : 02**
On completion of the course, the students will be able to:		**Bloom's Cognitive level**
CO1	Recall the concepts of Thermodynamics.	1
CO2	Discuss the behaviour of real gases.	2
CO3	Compute the thermodynamic quantities associated with different types of processes.	3
CO4	Explain the working of heat engine, different types of thermometers. Compare types of heat engines and their working; temperature scales.	4
CO5	Determine work done, efficiency of heat engines and coefficient of performance of refrigerators, temperatures using different scales and principles of thermometers.	5

CO6	Specify the different types of thermodynamic processes in daily life.	6
Title of the Course and Course Code	**Physics Practical – I (PHY 1103)**	**Number of Credits : 02**
On completion of the course, the students will be able to:		**Bloom's Cognitive level**
CO1	Identify various components, devices, instruments and tools for specific applications. Recall the theory associated with each experiment.	1
CO2	Illustrate skill of proper use of tools and test and measuring instruments.	2
CO3	Calculate the values of physical quantities using suitable instruments.	3
CO4	Explain the results by integrating the theory with experimental observations.	4
CO5	Evaluate various physical quantities and measure the errors therein.	5
CO6	Perform the experiments using proper procedures and specify the outcomes.Integrate the measuring instrumentation system with the experimental circuit as required.	6
F.Y. B.Sc. Semester II		
Title of the Course and Course Code	**Introduction to Mathematical Physics (PHY1201)**	**Number of Credits : 02**
On completion of the course, the students will be able to:		**Bloom's Cognitive level**
CO1	Define complex numbers.	1
CO2	Explain the importance of gradient, divergence and curl.	2
CO3	Solve vector identities.	3
CO4	Relate complex number operations with the help of diagrams.	4
CO5	Evaluate the angular velocity using vectors.	5
CO6	Compile the equations studied with complex and differential equations.	6
Title of the Course and Course Code	**Electricity and Magnetism (PHY1202)**	**Number of Credits : 02**
On completion of the course, the students will be able to:		**Bloom's Cognitive**

		level
CO1	Recall the concepts associated with stationary charges.	1
CO2	Discuss the atomic view of polarization of matter. Explain the correlation in electricity and magnetism.	2
CO3	Compute the boundary conditions and calculate quantities like current, voltage, power, phase, impedance, etc in DC and AC circuits.	3
CO4	Classify the phase relations in AC circuits.	4
CO5	Compare the growth and decay of current in DC circuits.	5
CO6	Write the phase relations between different parameters (like current, voltage, power and impedance) in simple electronic circuits comprising of resistors, inductors and capacitors.	6
Title of the Course and Course Code	**Physics Practical - II(PHY 1203)**	**Number of Credits : 02**
On completion of the course, the students will be able to:		**Bloom's Cognitive level**
CO1	Identify various components, devices, instruments and tools for specific applications. Recall the theory associated with each experiment.	1
CO2	Illustrate skill of proper use of tools and test and measuring instruments.	2
CO3	Calculate the values of physical quantities using suitable instruments.	3
CO4	Explain the results by integrating the theory with experimental observations.	4
CO5	Evaluate various physical quantities and measure the errors therein.	5
CO6	Perform the experiments using proper procedures and specify the outcomes. Integrate the measuring instrumentation system with the experimental circuit as required.	6
S.Y. B.Sc. Semester III		
Title of the Course and Course Code	**Oscillations, Waves and Sound (PHY 2301)**	**Number of Credits : 02**
On completion of the course, the students will be able to:		**Bloom's Cognitive level**
CO1	Define and describe concepts of undamped, damped and forced	1

	oscillations with rigorous mathematical treatment.	
CO2	Exemplify mathematical models for analysis of longitudinal and transverse waves.	2
CO3	Solve problems in wave mechanics, Doppler Effect and acoustic measurements.	3
CO4	Explain the concept of reverberation of sound and reverberation time.	4
CO5	Discriminate between undamped, damped and forced oscillations.	5
CO6	Develop mathematical treatment for wave motion in different modes.	6
Title of the Course and Course Code	**Principle and applications of Optics (PHY 2302)**	**Number of Credits : 02**
On completion of the course, the students will be able to:		**Bloom's Cognitive level**
CO1	Define terms interference, diffraction and polarization.	1
CO2	Articulate concepts of polarization of light, types of polarization, generation of polarized light. Illustrate concepts of Fresnel and Fraunhofer's diffraction.	2
CO3	Solve problems based on wavelength and refractive index measurement using Newton's ring, Michelson interferometer for closely spaced wavelength, antireflection coating, resolving power of telescope and grating, Malus law, retarders.	3
CO4	Explain the concept of thin film interference for uniform and non uniform film and their potential applications. Analyze different types of polarized light.	4
CO5	Consider different examples of Fresnel and Fraunhofer's diffraction. Compare resolving power of different telescopes.	5
CO6	Specify the potential applications of thin film interference and resolving power of grating and telescope.	6
Title of the Course and Course Code	**Practical course III (PHY 2303)**	**Number of Credits : 02**
On completion of the course, the students will be able to:		**Bloom's Cognitive level**

CO1	Define the objectives of a given experiment. Identify various components, devices, instruments and tools for specific applications.	1
CO2	Exemplify proper use of tools and testing of measuring instruments. Summarize the observations taken during the experimentation and tabulate the results.	2
CO3	Demonstrate handling of tools and instruments used for taking observations	3
CO4	Analyze the observed data. Calculate physical quantity as per the aim of experiment.	4
CO5	Standardize method to prepare technical report writing for laboratory exercises. Evaluate errors in observed values of physical quantities.	5
CO6	Construct circuits from drawings, the block diagrams for a given instrument / equipment. Develop skills of optical levelling, component testing and plotting of graphs with proper scale	6
S.Y. B.Sc. Semester IV		
Title of the Course and Course Code	**Introductory Quantum Physics and Special Theory of Relativity(PHY2401)**	**Number of Credits : 02**
On completion of the course, the students will be able to:		**Bloom's Cognitive level**
CO1	Recall and explain the phenomena like black body radiation, photoelectric effect, Compton effect, diffraction of photons/electrons from one/two slits, pair production etc.	1
CO2	Estimate knowledge of theoretical concepts and experimental confirmation of de Broglie hypothesis and other related principles.	2
CO3	Demonstrate problems arising due to discrepancies in theories and their inabilities in interpretation of experimental results pertaining to the atomic and nuclear structures which lead to discoveries of elementary particles. Classify the elementary particles.	3
CO4	Analyse the concepts of modern physics to matter waves.	4
CO5	Consider basic laws of quantum mechanics also serve to set up the mathematical foundations to pursue advanced topics in quantum mechanics and special theory of relativity.	5
CO6	Specify postulates of special theory of relativity and rewrite it with respect to space, time, and mass etc.	6
Title of the Course and	**Measurement Techniques in Physics (PHY2402)**	**Number of Credits : 02**

Course Code		
On completion of the course, the students will be able to:		**Bloom's Cognitive level**
CO1	Identify the physical quantities to be measured in the groups of mechanics, properties of matter, optics, electricity, magnetism, heat, and thermodynamics.	1
CO2	Explain the theory behind each experiment to measure the given parameter.	2
CO3	Use different instruments, devices, systems for organizing the experiments and recording the readings.	3
CO4	Arrange the apparatus to perform the experiment.	4
CO5	Determine the values of physical constants and values of parameters from the experimental data.	5
CO6	Compile the data and verify the results obtained.	6
Title of the Course and Course Code	**Practical course IV (PHY 2403)**	**Number of Credits : 02**
On completion of the course, the students will be able to:		**Bloom's Cognitive level**
CO1	Define the objectives of a given experiment. Identify Various components, devices, instruments and tools for specific applications.	1
CO2	Exemplify proper use of tools and testing of measuring instruments. Summarize the observations taken during the experimentation and tabulate the results.	2
CO3	Demonstrate handling of tools and instruments used for taking observations. Use computer software for data generation and plotting	3
CO4	Analyze the observed data, calculate physical quantity as per the aim of experiment.	4
CO5	Standardize method to prepare technical report writing for laboratory exercises. Evaluate errors in observed values of physical quantities.	5
CO6	Construct circuits from drawings, block diagrams for a given instrument / equipment. Develop skills of optical levelling, component testing and plotting of graphs with proper scale.	6
T.Y. B.Sc. Semester V		
Title of the	**Mathematical Methods in Physics (PHY3501)**	**Number of**

Course and Course Code		Credits : 02
On completion of the course, the students will be able to:		**Bloom's Cognitive level**
CO1	Recall the knowledge of calculus, vectors, vector calculus.	1
CO2	Illustrate methods of solving partial differential equations with the examples of important partial differential equations in Physics.	2
CO3	Apply the various methods for solving differential equations in various physical problems such as in quantum mechanics, which they will learn in future courses in detail.	3
CO4	Explain the Fourier analysis of periodic functions and reconstruct physical problems such as vibrating strings etc.	4
CO5	Determine transformation equations and construct various coordinate systems. Compare cartesian, spherical and cylindrical coordinate systems.	5
CO6	Formulate the special functions, such as the Hermite polynomials, the Legendre polynomials and Bessel functions and their differential equations.	6
Title of the Course and Course Code	**Solid State Physics (PHY3502)**	**Number of Credits : 02**
On completion of the course, the students will be able to:		**Bloom's Cognitive level**
CO1	List seven crystal systems.	1
CO2	Explain free electron theory and band theory.	2
CO3	Calculate lattice parameter from given XRD pattern.	3
CO4	Identify the structure of materials.	4
CO5	Evaluate the density of the state equation in 3D.	5
CO6	Specify the importance of magnetic materials.	6
T.Y. B.Sc. Semester VI		
Title of the Course and Course Code	**Classical Mechanics (PHY3503)**	**Number of Credits : 02**
On completion of the course, the students will be able to:		**Bloom's Cognitive level**

CO1	Describe methods of solving equations of motions.	1
CO2	Explain the necessity of considering constraints.	2
CO3	Apply different techniques to find solutions to problems in Mechanics.	3
CO4	Compare and contrast Newtonian, Lagrangian and Hamiltonian approaches.	4
CO5	Determine the constraint equations and decide the generalized coordinates to be used.	5
CO6	Hypothesize rotating frames of references.	6
Title of the Course and Course Code	**Atomic and Molecular Physics (PHY3504)**	**Number of Credits : 02**
On completion of the course, the students will be able to:		**Bloom's Cognitive level**
CO1	Recall and recognize the gradual development of the Atomic theory and distinguish between various atomic models.	1
CO2	Explain the effect of magnetic field on atomic spectra.	2
CO3	Solve the problems in Atomic theory.	3
CO4	Relate atomic theory to analyze spectra.	4
CO5	Evaluate spectroscopic data to identify elements using atomic spectra.	5
CO6	Develop mathematical treatment for the Bohr atom, Zeeman effect and Raman spectra.	6
Title of the Course and Course Code	**Elements of Material Science (PHY3505)**	**Number of Credits : 03**
On completion of the course, the students will be able to:		**Bloom's Cognitive level**
CO1	Describe types of materials, their properties and identify types of defects.	1
CO2	Explain functional properties of ceramic bulk materials and different nanomaterials.	2
CO3	Apply knowledge of mathematics and advanced science and engineering principles to materials systems.	3

CO4	Explain applications of Polymers for research and industrial applications, determine concentration, purity of material and molecular weight.	4
CO5	Select materials for design and construction. Test materials using different characterization methods with the fundamental principles underlying and connecting the structure and properties.	5
CO6	Design and construct different Phase Diagrams under different combinations and thermodynamic states.	6
Title of the Course and Course Code	**Lasers - (PHY3506)**	**Number of Credits : 02**
On completion of the course, the students will be able to:		**Bloom's Cognitive level**
CO1	Describe the requirements for a system to act as a laser.	1
CO2	Explain concept of Laser fundamentals, pumping mechanism pumping schemes.	2
CO3	Demonstrate potential applications of Lasers.	3
CO4	Differentiate the various types of Lasers and their means of excitation.	4
CO5	Compare three level and four level Laser systems.	5
CO6	Design and develop different laser systems.	6
Title of the Course and Course Code	**Physics Practical Paper – I (PHY3507)**	**Number of Credits : 02**
On completion of the course, the students will be able to:		**Bloom's Cognitive level**
CO1	Describe different experimental techniques to determine values of various constants, coefficients, parameters.	1
CO2	Arrange the apparatus as per the requirements of the aims and objectives of the experiment.	2
CO3	Demonstrate the procedure to perform the experiments and the skills required for the particular experiment.	3
CO4	Explain the theory behind the formulae used and Validate the hypotheses.	4
CO5	Standardize the entire procedure to obtain reliable, repeatable results.	5

CO6	Perform the experiment, tabulate the data, identify the sources of errors, and show how to minimize the errors.	6
Title of the Course and Course Code	**Physics Practical Paper – II - (PHY3508)**	**Number of Credits : 03**
On completion of the course, the students will be able to:		**Bloom's Cognitive level**
CO1	Describe different experimental techniques to determine values of various constants, coefficients, parameters.	1
CO2	Arrange the apparatus as per the requirements of the aims and objectives of the experiment.	2
CO3	Demonstrate the procedure to perform the experiments and the skills required for the particular experiment	3
CO4	Explain the theory behind the formulae used and Validate the hypotheses.	4
CO5	Standardize the entire procedure to obtain reliable, repeatable results.	4, 5
CO6	Perform the experiment, tabulate the data, identify the sources of errors, and show how to minimize the errors.	6
Title of the Course and Course Code	**Physics Practical – III - (PHY3509)**	**Number of Credits : 02**
On completion of the course, the students will be able to:		**Bloom's Cognitive level**
CO1	Describe different experimental techniques to determine values of various constants, coefficients, parameters.	1
CO2	Arrange the apparatus as per the requirements of the aims and objectives of the experiment.	2
CO3	Demonstrate the procedure to perform the experiments and the skills required for the particular experiment.	3
CO4	Explain the theory behind the formulae used and Validate the hypotheses.	4
CO5	Standardize the entire procedure to obtain reliable, repeatable results.	5
CO6	Perform the experiment, tabulate the data, identify the sources of errors, and show how to minimize the errors.	6

Title of the Course and Course Code	**Analog Electronics - (PHY3511)**	**Number of Credits : 02**
On completion of the course, the students will be able to:		**Bloom's Cognitive level**
CO1	Recall basic knowledge of physical and electrical conducting properties of semiconductors.	1
CO2	Explain the effect of negative feedback on different parameters of an Amplifier and different types of negative feedback topologies.	2
CO3	Apply the knowledge to build, and troubleshoot Analog circuits using IC555, VCO, etc.	3
CO4	Explain the effect of positive feedback, design and working of different Oscillators using BJTS and operational amplifiers.	4
CO5	Evaluate the working of BJT / FET amplifiers.	5
CO6	Design amplifier circuits using BJT and FET and observe the amplitude and frequency responses of common amplifier circuits.	6
Title of the Course and Course Code	**Numerical Analysis - (PHY3512)**	**Number of Credits : 02**
On completion of the course, the students will be able to:		**Bloom's Cognitive level**
CO1	Identify modern numerical methods and describe the extent and limitations of computational methods in physics.	1
CO2	Discuss the characteristics of various numerical methods.	2
CO3	Solve the problem using numerical methods techniques and computationally solve a selection of problems in physics.	3
CO4	Explain and solve the physics problem using numerical methods, write a program for it using leading-edge tools.	4
CO5	Compare the tools, methodologies, language to test various physics problems.	5
CO6	Design the physics system and solve it, collect the result and discuss, justify and communicate ideas and explanations.	6

Title of the Course and Course Code	Radiation Physics (PHY3513)	Number of Credits : 02
On completion of the course, the students will be able to:		**Bloom's Cognitive level**
CO1	Describe interaction of radiations with matter.	1
CO2	Discuss radiation sources and radiation shielding.	2
CO3	Classify different radiation detectors and specify their application.	3
CO4	Explain different radiation units for measurement of radiation exposure.	4
CO5	Evaluate safety protocols for radiation protection.	5
CO6	Specify application of radiation sources in different areas.	6

Title of the Course and Course Code	BioPhysics (PHY3514)	Number of Credits : 02
On completion of the course, the students will be able to:		**Bloom's Cognitive level**
CO1	Recall and identify physical properties related to biological systems.	1
CO2	Discuss types of transducers used for processing bioelectric signals.	2
CO3	Solve qualitative and quantitative problems.	3
CO4	Explain the working of bioinstruments and other techniques used for analysing biological signals.	4
CO5	Evaluate bioelectric signals.	5
CO6	Integrate physics concepts with biological systems for better understanding.	6

T.Y. B.Sc. Semester VI

Title of the Course and Course Code	Classical Electrodynamics (PHY3601)	Number of Credits : 02
On completion of the course, the students will be able to:		**Bloom's Cognitive level**
CO1	Define electric fields, electric potential, displacement vector, electric Polarization.	1

CO2	Articulate concepts of evaluating electric fields due to line charge, surface charge and volume charge using Coulomb's law and Gauss's law. Explain mechanism of polarization in dielectrics.	2
CO3	Demonstrate special techniques to calculate potential due to some charge distribution.	3
CO4	Explain motion of charged particles in the electromagnetic field. Deduce Biot Savart's law from Ampere's law.	4
CO5	Compare magnetic properties of material on the basis of total spin of electrons in atoms. Distinguish between diamagnetic and paramagnetic materials.	5
CO6	Compile Maxwell's set of equations and develop electromagnetic plane wave equations.	6
Title of the Course and Course Code	**Quantum Mechanics (PHY3602)**	**Number of Credits : 02**
On completion of the course, the students will be able to:		**Bloom's Cognitive level**
CO1	Describe and learn theoretical aspects at Quantum Level.	1
CO2	Clarify more about the insight of the microscopic world.	2
CO3	Apply Schrodinger's equation for different cases of potential (V).	3
CO4	Explain the concept of operators and apply it in Quantum mechanics.	4
CO5	Review Hydrogen atom model and quantum numbers n, l, m_l, m_s and degeneracy etc.	5
CO6	Write Schrodinger's equation in a Spherically symmetric polar coordinate system.	6
Title of the Course and Course Code	**Thermodynamics and Statistical Mechanics (PHY3603)**	**Number of Credits : 02**
On completion of the course, the students will be able to:		**Bloom's Cognitive level**
CO1	Define thermodynamic quantities and functions.	1
CO2	Estimate the probabilities in statistical processes.	2
CO3	Apply the knowledge of Entropy and density of states to understand the concept of temperature.	3

CO4	Explain the quantum statistics and differentiate between classical and quantum statistics.	4
CO5	Compare the MB, BE and FD statistics and classify particles according to them.	5
CO6	Design statistical tools to study thermodynamic interactions in ensembles.	6
Title of the Course and Course Code	**Nuclear Physics (PHY3604)**	**Number of Credits : 02**
On completion of the course, the students will be able to:		**Bloom's Cognitive level**
CO1	Define and describe basic properties of the nucleus.	1
CO2	Explain the concept of radioactivity. Classify different radiation detectors and nuclear models.	2
CO3	Solve problems related to nuclear and particle physics.	3
CO4	Explain nuclear reaction dynamics, nuclear reactors and accelerators.	4
CO5	Compare nuclear energy with other energy sources.	5
CO6	Specify applications of accelerators and detectors. Compile knowledge of elementary particles to understand nuclear phenomena.	6
Title of the Course and Course Code	**Astronomy and Astrophysics (PHY3605)**	**Number of Credits : 02**
On completion of the course, the students will be able to:		**Bloom's Cognitive level**
CO1	Identify, classify and locate celestial objects, the vastness of Space and familiarize with the components of the Universe. Relate with observational astronomy and tools used for the purpose.	1
CO2	Explain nuclear reactions in stars and synthesis of elements in the universe and various cosmologies	2
CO3	Apply skills in identifying spectra of celestial objects and data analysis.	3
CO4	Analyze and classify stellar spectra.	4
CO5	Measure stellar distances.	5
CO6	Prepare sky charts and make meteor observation logs.	6

Title of the Course and Course Code	**Energy Studies (PHY3606)**	**Number of Credits : 02**
On completion of the course, the students will be able to:		**Bloom's Cognitive level**
CO1	Describe the environmental aspects of non-conventional energy resources. In Comparison with various conventional energy systems, their prospects and limitations.	1
CO2	Discuss the need of renewable energy resources, historical and latest developments.	2
CO3	Illustrate the use of solar energy and the various components used in the energy production with respect to applications like - heating, cooling, desalination, power generation, drying, cooking etc.	3
CO4	Explain the need of Wind Energy and classify the various components used in energy generation.	4
CO5	Recommend the concept of Biomass energy resources and their classification, types of biogas Plants- applications.	5
CO6	Write about Solar, Wind and bio energy systems, their prospects, advantages and limitations. Compile the knowledge of fuel cells, wave power, tidal power and geothermal principles and applications.	6
Title of the Course and Course Code	**Physics Practical Paper –IV (PHY3607)**	**Number of Credits : 02**
On completion of the course, the students will be able to:		**Bloom's Cognitive level**
CO1	Describe different experimental techniques to determine values of various constants, coefficients, parameters.	1
CO2	Arrange the apparatus as per the requirements of the aims and objectives of the experiment.	2
CO3	Demonstrate the procedure to perform the experiments and the skills required for the particular experiment.	3
CO4	Explain the theory behind the formulae used and validate the hypotheses.	4
CO5	Standardize the entire procedure to obtain reliable, repeatable results.	5
CO6	Perform the experiment, tabulate the data, identify the sources of errors, and show how to minimize the errors.	6
Title of the Course and	**Physics Practical Paper –V (PHY3608)**	**Number of Credits : 02**

Course Code		
On completion of the course, the students will be able to:		**Bloom's Cognitive level**
CO1	Describe different experimental techniques to determine values of various constants, coefficients, parameters.	1
CO2	Arrange the apparatus as per the requirements of the aims and objectives of the experiment.	2
CO3	Demonstrate the procedure to perform the experiments and the skills required for the particular experiment.	3
CO4	Explain the theory behind the formulae used and validate the hypotheses.	4
CO5	Standardize the entire procedure to obtain reliable, repeatable results.	5
CO6	Perform the experiment, tabulate the data, identify the sources of errors, and show how to minimize the errors.	6
Title of the Course and Course Code	**Physics Practical Paper –VI (PHY3609)**	**Number of Credits : 02**
On completion of the course, the students will be able to:		**Bloom's Cognitive level**
CO1	Describe the necessity, need, relevance and importance of the project undertaken.	1
CO2	Outline the work into small tasks like reference work, collection of equipment and materials, the apparatus as per the requirements of the aims and objectives of the project, actual performance of experiment, data collection etc.	2
CO3	Carry out the experiments as per the designed procedure to achieve the goals.	3
CO4	Explain the theory behind the formulae used, collect and analyze the data and validate the hypotheses.	4
CO5	Standardize the entire procedure to obtain reliable, repeatable results. Compare and Contrast if necessary, with the published data to Justify the results obtained.	5
CO6	Prepare a project report, compile and quote the references properly. Develop an ability to communicate effectively and present project work to a panel of experts.	6
Title of the Course and Course Code	**Digital Electronics (PHY3611)**	**Number of Credits : 02**
On completion of the course, the students will be able to:		**Bloom's Cognitive**

		level
CO1	Recall the basic digital gates, binary arithmetic, and principles of Boolean algebra.	1
CO2	Explain internal block and detailed diagrams and working of the Digital Integrated circuits.	2
CO3	Illustrate use of encoders, decoders, multiplexers in various circuits.	3
CO4	Explain working of flip flops, counters, and registers.	4
CO5	Compare ADC and DAC techniques.	5
CO6	Design digital circuits for dedicated applications.	6
Title of the Course and Course Code	**C - Programming (PHY3612)**	**Number of Credits : 02**
On completion of the course, the students will be able to:		**Bloom's Cognitive level**
CO1	Describe the basic structure of C language, concept of Flowchart and Algorithm and define functions and pointers.	1
CO2	Discuss the structure of C language, keywords, operators, constants and variables, control statements, standard I/P functions etc.	2
CO3	Implement C programming to solve the basic problems in Physics and objective oriented tasks.	3
CO4	Explain the basics of graphics in C programming.	4
CO5	Review the use of Arrays.	5
CO6	Write the programs using C language.	6
Title of the Course and Course Code	**Biomedical Instrumentation (PHY3613)**	**Number of Credits : 03**
On completion of the course, the students will be able to:		**Bloom's Cognitive level**
CO1	Describe the physiology of the biomedical system.	1
CO2	Explain the physical and medical principles of biomedical instrumentation and measure biomedical and physiological information.	2

CO3	Illustrate the application of Electronics in diagnostics and therapeutic area.	3
CO4	Analyze the effect of different methods, danger potential, possibilities and potential developments in biomedical instrumentation.	4
CO5	Compare different types of electrical medical equipment, advantages and disadvantages of different methods, sources of error and risks involved in various methods.	5
CO6	Specify the required techniques for analyzing effects related to nervous, respiratory and cardiovascular issues.	6
Title of the Course and Course Code	**Physics of Nanomaterials (PHY3614)**	**Number of Credits : 03**
On completion of the course, the students will be able to:		**Bloom's Cognitive level**
CO1	List different types and forms of nanomaterials.	1
CO2	Explain the effects of quantum confinement on the electronic structure and corresponding physical and chemical properties of materials at nanoscale.	2
CO3	Outline appropriate synthesis technique to synthesize quantum nanostructures of desired size, shape and surface properties.	3
CO4	Relate properties of nanostructures with their size, shape and surface characteristics.	4
CO5	Justify enhanced sensitivity of nanomaterial based sensors and their novel applications in industry.	5
CO6	Specify applications of novel nanomaterials in medicine, defence, society, etc.	6