(University of Delhi)
Shyam Lal College

Programme Specific Outcomes and Course Outcomes

Physics Courses for B.Sc. (Physical Science) with Chemistry and B.Sc. (Physical Science) with Electronics

Program Outcomes

Program	Program Outcomes
Bachelors of Science (Physical Science) **Physics and Electronics Discipline**	After studying Physics and Electronics in B.Sc. Program students will be able to: **PO1:** Gain an understanding of the fundamental principles of science governing the behavior of the world around us. **PO2:** sharpen analytical thinking, problem-solving prowess, and critical reasoning which are versatile skills applicable across a multitude of domains. **PO3:** Foster creativity and innovation, encouraging students to think and develop novel solutions to complex problems. **PO4:** fostering collaboration and interdisciplinary approaches to problem-solving. **PO5:** With a strong foundation in mathematics and problem-solving skills, students can excel in roles that involve data analysis, modeling complex systems, and simulations. **PO6:** The students may pursue careers in research institutions or academia, conducting experiments, publishing papers, and teaching at universities and colleges. **PO7:** Science education instills a sense of ethical conduct and professional responsibility in graduates, emphasizing integrity, safety, and adherence to ethical standards in research and practice. **PO8:** The program equips graduates with the skills and knowledge necessary to pursue competitive examinations or enroll in their preferred postgraduate program, providing them with opportunities to advance their academic or professional careers. **PO9:** Students can pursue further education or careers in physics, chemistry, materials science, engineering, education, or related areas.

Program Specifics Outcomes

Program	Program Specific Outcomes
Bachelors of Science (Physical Science) **Physics and Electronics Discipline**	**PSO1:** Students get acquainted with a comprehensive understanding of core physics principles such as mechanics, electromagnetism, thermodynamics, quantum mechanics, Earth Sciences, relativity, Condensed matter Physics and Nuclear and Particle Physics. **PSO2:** Physics discipline typically requires strong mathematical proficiency. Students get accomplished in mathematical techniques such as calculus, differential equations, linear algebra, and vector calculus. **PSO3:** Students will be proficient in designing, analyzing, and troubleshooting both analog and digital electronic circuits, including amplifiers, filters, oscillators, and digital logic circuits. **PSO4:** Through laboratory courses and experiments, students develop hands-on skills in experimental design, analysis, and interpretation of results, enhancing their ability to apply theoretical concepts to practical situations. **PSO5:** Provide students with the knowledge and skill base that would enable them to undertake further studies in Physics and related areas. **PSO6:** Develop a good understanding of semiconductor materials, device physics, and fabrication techniques, including the operation of diodes, transistors, integrated circuits, and semiconductor devices used in various electronic applications. **PSO7:** BSc Physics and Electronics programs cover topics related to signal processing, modulation, demodulation, and communication systems, preparing graduates for careers in telecommunications, wireless communication, and signal processing industries.

Physics Courses for B. Sc (Physical Science)

Course Outcomes

Semester 1:		
Course Name	**Learning Outcomes**	**Methodology to achieve Specific Outcomes**
Mechanics	**CO1:** Understand the role of vectors and coordinate systems in Physics; solve Ordinary Differential Equations, laws of motion and their application. **CO2:** Learn the concept of Inertial reference frames. **CO3:** Learn the concept of conservation of energy, momentum, and angular momentum and apply them to basic problems. **CO4:** Learn the concept of Particle collision (elastic and inelastic collisions). **CO5:** Learn the concept of Motion of a simple pendulum **CO6:** Understand the special theory of relativity - special relativistic effects and their effects on the mass and energy of a moving object.	**1.** Use of Visual aids, such as charts, diagrams, graphs, and pictures, to illustrate abstract concepts in physics. **2.** Use of visual aids to represent scientific principles, formulas, and experimental setups. **3.** Using multimedia resources, including videos, animations, simulations, and interactive software, to provide students with dynamic visual representations of physical phenomena. **4.** Blended mode of teaching with a flip classroom approach. **5.** Laboratory experiments and practical demonstrations. **6.** Use of Online resources, educational websites, virtual laboratories, and online textbooks, such as SWAYAM, NPTEL, Amrita Lab and e-gyankosh. **7.** Assessment based upon continuous evaluation including quizzes, assignments projects, presentations, and class tests.
Semester 2:		
Course Name	**Learning Outcomes**	**Methodology to achieve Specific Outcomes**

Electricity and Magnetism	**CO1:** Demonstrate Gauss law, and Coulomb's law for the electric field, and apply it to systems of point charges as well as line, surface, and volume distributions of charges. **CO2:** Apply Gauss's law of electrostatics to solve a variety of problems. Articulate knowledge of electric current, resistance and capacitance in terms of electric field and electric potential. **CO3:** Calculate the magnetic forces that act on moving charges and the magnetic fields due to currents (Biot- Savart and Ampere laws) **CO4:** Have a brief idea of magnetic materials, understand the concepts of induction, and solve problems using Faraday's and Lenz's laws	**1.** Use of Visual aids, such as charts, diagrams, graphs, and pictures, to illustrate abstract concepts in physics. **2.** Use of visual aids to represent scientific principles, formulas, and experimental setups. **3.** Using multimedia resources, including videos, animations, simulations, and interactive software, to provide students with dynamic visual representations of physical phenomena. **4.** Blended mode of teaching with a flip classroom approach. **5.** Laboratory experiments and practical demonstrations. **6.** Use of Online resources, educational websites, virtual laboratories, and online textbooks, such as SWAYAM, NPTEL, Amrita Lab and e-gyankosh. **7.** Assessment based upon continuous evaluation including quizzes, assignments projects, presentations, and class tests.
Semester 3:		
Course Name	**Learning Outcomes**	**Methodology to achieve Specific Outcomes**

Heat and Thermodynamics	**CO1:** Learn the basic concepts of thermodynamics, the first and the second laws of thermodynamics, the concept of entropy and the associated theorems, the thermodynamic potentials and their physical interpretations. They are also expected to learn Maxwell's thermodynamic relations. **CO2:** Know the fundamentals of the kinetic theory of gases, Maxwell-Boltzman distribution law, equipartition of energies, and mean free path of molecular collisions, **CO3:** Learn about the black body radiations, Stefan-Boltzmann's law, Rayleigh-Jean's law , and Planck's law and their significance. **CO4:** Learn the quantum statistical distributions, viz., the Bose-Einstein statistics and the Fermi-Dirac statistics.	**1.** Use of Visual aids, such as charts, diagrams, graphs, and pictures, to illustrate abstract concepts in physics. **2.** Use of visual aids to represent scientific principles, formulas, and experimental setups. **3.** Using multimedia resources, including videos, animations, simulations, and interactive software, to provide students with dynamic visual representations of physical phenomena. **4.** Blended mode of teaching with a flip classroom approach. **5.** Laboratory experiments and practical demonstrations. **6.** Use of Online resources, educational websites, virtual laboratories, and online textbooks, such as SWAYAM, NPTEL, Amrita Lab and e-gyankosh. **7.** Assessment based upon continuous evaluation including quizzes, assignments projects, presentations, and class tests.

Mathematical Physics	**CO1:** Learn the functions more than one variable using the concepts of calculus. **CO2:** Solve first-order differential equations and apply it to physical problems. **CO3:** Represent a periodic function by a sum of harmonics using the Fourier series. **CO4:** Obtain power series solution of differential equation of 2nd order with variable coefficients using Frobenius method. **CO5:** Learn beta and gamma functions.	**1.** Use of visual aids to represent scientific principles, formulas, and experimental setups. **2.** Blended mode of teaching with a flip classroom approach. **3.** Use of Online resources, educational websites, virtual laboratories, and online textbooks, such as SWAYAM, NPTEL, Amrita Lab and e-gyankosh. **4.** Assessment based upon continuous evaluation including quizzes, assignments projects, presentations, and class tests.
Semester 4:		
Course Name	**Learning Outcomes**	**Methodology to achieve Specific Outcomes**

Waves and Optics	**CO1:** Understand simple harmonic oscillation and superposition principle. **CO2:** Understand superposition of a range of collinear and mutually perpendicular simple harmonic motions and their applications. **CO3:** Understand concept of normal modes in stationary waves: their frequencies and configurations. **CO4:** Understand Interference as a superposition of waves from coherent sources derived from the same parent source. **CO5:** Demonstrate understanding of Interference experiments: Young's Double Slit, Fresnel's biprism, Llyod's Mirror, Newton's Rings. **CO6:** Demonstrate basic concepts of Diffraction: Superposition of wavelets diffracted from apertures. **CO7:** Understand Fraunhofer Diffraction from a slit, double slit, grating	**1.** Use of Visual aids, such as charts, diagrams, graphs, and pictures, to illustrate abstract concepts in physics. **2.** Use of visual aids to represent scientific principles, formulas, and experimental setups. **3.** Using multimedia resources, including videos, animations, simulations, and interactive software, to provide students with dynamic visual representations of physical phenomena. **4.** Blended mode of teaching with a flip classroom approach. **5.** Laboratory experiments and practical demonstrations. **6.** Use of Online resources, educational websites, virtual laboratories, and online textbooks, such as SWAYAM, NPTEL, Amrita Lab and e-gyankosh. **7.** Assessment based upon continuous evaluation including quizzes, assignments projects, presentations, and class tests.

Physics of Earth	**CO1:** Have an overview of structure of the earth as well as various dynamical processes occurring on it. **CO2:** Develop an understanding of evolution of the earth. **CO3:** Apply physical principles of elasticity and elastic wave propagation to understand modern global seismology as a probe of the Earth's internal structure. **CO4:** Understand the origin of magnetic field, geodynamics of earthquakes and the description of seismic sources; a simple but fundamental theory of thermal convection; the distinctive rheological behaviour of the upper mantle and its top. **CO5:** Explore various roles played by water cycle, carbon cycle, nitrogen cycles in maintaining steady state of earth leading to better understanding of the contemporary dilemmas (climate change, bio diversity loss, population growth, etc.) disturbing the Earth	**1.** Use of Visual aids, such as charts, diagrams, graphs, and pictures, to illustrate abstract concepts in physics. **2.** Use of visual aids to represent scientific principles, formulas, and experimental setups. **3.** Using multimedia resources, including videos, animations, simulations, and interactive software, to provide students with dynamic visual representations of physical phenomena. **4.** Blended mode of teaching with a flip classroom approach. **5.** Use of Online resources, educational websites, virtual laboratories, and online textbooks, such as SWAYAM, NPTEL, Amrita Lab and e-gyankosh. **6.** Assessment based upon continuous evaluation including quizzes, assignments projects, presentations, and class tests.
Semester 5:		
Course Name	**Learning Outcomes**	**Methodology to achieve Specific Outcomes**

Elements of Modern Physics	**CO1:** Explain how quantum mechanical concepts answer some of the unanswered questions of Classical mechanics such as the photoelectric effect, Compton scattering, etc. **CO2:** Explain the inadequacy of the Rutherford model, discrete atomic spectra from hydrogen-like atoms, and its explanation on a quantum mechanical basis. **CO3:** Demonstrate ability to apply wave-particle duality and uncertainty principles to solve physics problems. **CO4:** Explain two slit interference experiments with photons, atoms, and particles establishing non-deterministic nature of QM. **CO5:** Set up Schrodinger equation for behavior of a particle in a field of force for simple potential and find wave solutions establishing wave-like nature of particles. **CO6:** Demonstrate ability to solve 1-D quantum problems including the quantum particle in a box, a well and the transmission and reflection of waves. **CO7:** Explain nuclear structure, binding energy, nuclear models and impossibility of an electron being in the nucleus as a consequence of the uncertainty principle. **CO8:** Understand radioactivity, radioactive decays, apply radioactive laws to solve related physics problems and Pauli's prediction of neutrino, and the subsequent discovery.	**1.** Use of Visual aids, such as charts, diagrams, graphs, and pictures, to illustrate abstract concepts in physics. **2.** Use of visual aids to represent scientific principles, formulas, and experimental setups. **3.** Using multimedia resources, including videos, animations, simulations, and interactive software, to provide students with dynamic visual representations of physical phenomena. **4.** Blended mode of teaching with a flip classroom approach. **5.** Laboratory experiments and practical demonstrations. **6.** Use of Online resources, educational websites, virtual laboratories, and online textbooks, such as SWAYAM, NPTEL, Amrita Lab and e-gyankosh. **7.** Assessment based upon continuous evaluation including quizzes, assignments projects, presentations, and class tests.
Semester 6:		
Course Name	**Learning Outcomes**	**Methodology to achieve Specific Outcomes**

Solid State Physics	**CO1:** Elucidate the concept of lattice, crystals and symmetry operations. **CO2:** Understand the elementary lattice dynamics and its influence on the properties of materials. **CO3:** Describe the main features of the physics of electrons in solids: origin of energy bands, and their influence electronic behavior. **CO4:** Explain the origin of dia-, para-and ferro-magnetic properties of solids. **CO5:** Explain the origin of the dielectric properties exhibited by solids and the concept of polarizability. **CO6:** Learn the superconductivity in solid.	**1.** Use of Visual aids, such as charts, diagrams, graphs, and pictures, to illustrate abstract concepts in physics. **2.** Use of visual aids to represent scientific principles, formulas, and experimental setups. **3.** Using multimedia resources, including videos, animations, simulations, and interactive software, to provide students with dynamic visual representations of physical phenomena. **4.** Blended mode of teaching with a flip classroom approach. **5.** Laboratory experiments and practical demonstrations. **6.** Use of Online resources, educational websites, virtual laboratories, and online textbooks, such as SWAYAM, NPTEL, Amrita Lab and e-gyankosh. **7.** Assessment based upon continuous evaluation including quizzes, assignments projects, presentations, and class tests.

Basic Instrumentation Skill (SEC)	**CO1**: Course learning begins with a basic understanding of the measurement and errors in measurement. It then familiarizes with every specification of a multimeter, multivibrators, rectifiers, amplifiers, oscillators, and high voltage probes and their significance in hands-on mode. **CO2:** Explanation of the specifications of CRO and their significance. A complete explanation of CRT. **CO3:** Students learn the use of CRO for the measurement of voltage (DC and AC), frequency, and period. Students learn the principles of voltage measurement. **CO4**: Students should be able to understand the advantages of electronic voltmeters over conventional multimeters in terms of sensitivity etc. **CO5**: Types of AC millivoltmeters should be covered. **CO6**: Covers the explanation and specifications of Signal and pulse Generators: low-frequency signal generator and pulse generator. Students should be familiar with testing and specifications. **CO7**: Students learn about the working principles and specifications of basic LCR bridges. **CO8**: Hands-on ability to use analog and digital instruments like digital multimeter and frequency counter.	**1.** Use of Visual aids, such as charts, diagrams, graphs, and pictures, to illustrate abstract concepts in physics. **2.** Use of visual aids to represent scientific principles, formulas, and experimental setups. **3.** Using multimedia resources, including videos, animations, simulations, and interactive software, to provide students with dynamic visual representations of physical phenomena. **4.** Blended mode of teaching with a flip classroom approach. **5.** Laboratory experiments and practical demonstrations. **6.** Use of Online resources, educational websites, virtual laboratories, and online textbooks, such as SWAYAM, NPTEL, Amrita Lab and e-gyankosh. **7.** Assessment based upon continuous evaluation including quizzes, assignments projects, presentations, and class tests.

Science and Society (VAC)	This paper is interdisciplinary in nature and provides students with basic exposure to scientific methods, technologies and developments that have played a significant role in the evolution of human society from ancient to modern times. **CO1:** Learn the scientific method, importance of observation, questions and experimental design, rational thinking, myths vs. facts. **CO2:** Learn Science, Technology and Traditional Practices: that include Water harvesting structures and practices, Construction, architecture and design – use of natural environment-friendly designs and materials, Agriculture including domestication of plants and animals **CO3**: Learn Science and Technology in Modern Times that include areas such as Public Health: Nutrition, Hygiene, Physical and Mental Health, Vaccines, and Antibiotics, Anti-microbial resistance, Food Security: Green Revolution, White Revolution, IT Revolution, eGovernance, Clean Energy, Renewable Energy, Space Science and Exploration, Evolution, Ecology and Environment. **CO4**: Appreciate the scientific method through observation, experimentation, analysis and discussions. Students are required to participate in activities and experiments. **CO5:** Understand Contemporary Developments such as Climate change and global warming, Threats to biodiversity and habitat degradation, Genomics and modern medicine, Genetically engineered crops, Artificial intelligence and robotics, Big Data Analytics, Citizen science and science communication, Science of natural disasters and their management.	Pedagogy in this course should largely rely on learning by enquiry, observations, experimentation and group discussions using case studies/examples. **1.** Use of Visual aids, such as charts, diagrams, graphs, and pictures, to illustrate abstract concepts in physics. **2.** Use of visual aids to represent scientific principles, formulas, and experimental setups. **3.** Using multimedia resources, including videos, animations, simulations, and interactive software, to provide students with dynamic visual representations of physical phenomena. **4.** Blended mode of teaching with a flip classroom approach. **5.** Laboratory experiments and practical demonstrations. **6.** Use of Online resources: http://abyss.uoregon.edu/~js/21st_century_science/lectures/lec01.html https://wps.ablongman.com/wps/media/objects/1449/1483820/18_2.pdf https://www.sciencelearn.org.nz/resources/415-myths-of-the-nature-of-science https://www.visualcapitalist.com/history-of-technology-earliest-tools-modernage/ https://worldwaterreserve.com/introduction-to-rainwater-harvesting/ https://www.ajpmonline.org/article/S0749-3797(11)00514-9/fulltext https://study.com/academy/lesson/public-health-vs-medicine-differencessimilarities

Digital Empowe r-ment **(VAC)**	**CO1:** The students will learn to use ICT and digital services in daily life. Communicate and collaborate in cyberspace using social platforms, teaching/learning tools. **CO2:** Understand the significance of security and privacy in the digital world. **CO3:** Recognize ethical issues in the cyber world.	**1.** Use of Visual aids, such as charts, diagrams, graphs, and pictures. **2.** Activities/projects exploring digital services in araes suchas education, health, planning, farming, security, cyber security, financial justice and e-kranti etc.

Additional Courses for B.Sc. (Physical Science) with Electronics

Semester 1:		
Course Name	**Learning Outcomes**	**Methodology (to achieve specific outcomes)**
Network Analysis and Analog Electronics	**CO1:** To understand the concept of voltage and current sources, Network theorems, Mesh and Node Analysis. **CO2:** To develop an understanding of the basic operation and characteristics of different type of diodes and familiarity with its working and applications. **CO3:** Become familiar with Half-wave, Full-wave center tapped and bridge rectifiers. To be able to calculate ripple factor and efficiency. **CO4:** To be able to recognize and explain the characteristics of a PNP or NPN transistor. **CO5:** Become familiar with the load-line analysis of the BJT configurations and understand the hybrid model (h- parameters) of the BJT transistors. **CO6:** To be able to perform a small signal analysis of Amplifier and understand its classification. **CO7:** To be able to perform analysis of two stages R-C coupled Amplifier. **CO8:** To understand the concept of positive and negative feedback along with applications of each type of feedback and the working of Oscillators. **CO9:** To become familiar with construction, working and characteristics of JFET and UJT	**1.** Use of Visual aids, such as charts, diagrams, graphs, and pictures, to illustrate abstract concepts in physics. **2.** Use of visual aids to represent scientific principles, formulas, and experimental setups. **3.** Using multimedia resources, including videos, animations, simulations, and interactive software, to provide students with dynamic visual representations of physical phenomena. **4.** Blended mode of teaching with a flip classroom approach. **5.** Laboratory experiments and practical demonstrations. **6.** Use of Online resources, educational websites, virtual laboratories, and online textbooks, such as SWAYAM, NPTEL, Amrita Lab and e-Gyan Kosh. **7.** Assessment based upon continuous evaluation including quizzes, assignments projects, presentations, and class tests. **8.** Hands-on training with various instruments (CRO, DSO, Function generator etc.) **9.** Virtual tour of industries.
Semester 2:		

Course Name	Learning Outcomes	Methodology (to achieve specific outcomes)
Linear and Digital Integrated Circuits	**CO1:** To understand Op-Amp basics and its various applications. **CO2:** To become familiar with number systems and codes, Logic Gates, and Boolean Algebra Theorems. **CO3:** To understand the minimization techniques for designing a simplified logic circuit. **CO4:** To design a half Adder, Full Adder, Half- Subtractor, Full Subtractor. **CO5:** To understand the working of Data processing circuits Multiplexers, DE multiplexers, Decoders, and Encoders. **CO6:** To become familiar with the working of flip-flop circuits, working and applications.	**1.** Use of Visual aids, such as charts, diagrams, graphs, and pictures, to illustrate abstract concepts in physics. **2.** Use of visual aids to represent scientific principles, formulas, and experimental setups. **3.** Using multimedia resources, including videos, animations, simulations, and interactive software, to provide students with dynamic visual representations of physical phenomena. **4.** Blended mode of teaching with a flip classroom approach. **5.** Laboratory experiments and practical demonstrations. **6.** Use of Online resources, educational websites, virtual laboratories, and online textbooks, such as SWAYAM, NPTEL, Amrita Lab and e-Gyan Kosh. **7.** Assessment based upon continuous evaluation including quizzes, assignments projects, presentations, and class tests. **8.** Hands-on training with various instruments (CRO, DSO, Function generator etc.) **9.** Virtual tour of industries.
Semester 3:		
Course Name	**Learning Outcomes**	**Methodology (to achieve specific outcomes)**

Communication Electronics	**CO1:** The concepts of electronics in communication, introduction to the principle, performance and applications of communication systems. **CO2:** Various means and modes of communication, electromagnetic communication spectrum with an idea of frequency allocation for radio communication system in India. **CO3:** An insight on the use of different modulation and demodulation techniques used in analog communication **CO4:** Analyze different parameters of analog communication techniques. **CO5:** Learn the generation and detection of a signal through pulse and digital modulation techniques and multiplexing. **CO6:** In-depth understanding of different concepts used in a satellite communication system, geosynchronous, geostationary satellite, uplink downlink, ground and earth station, **CO7:** design and understand mobile technologies mobile communication generations sim number IMEI number GPS system	**1.** Use of Visual aids, such as charts, diagrams, graphs, and pictures, to illustrate abstract concepts in physics. **2.** Use of visual aids to represent scientific principles, formulas, and experimental setups. **3.** Using multimedia resources, including videos, animations, simulations, and interactive software, to provide students with dynamic visual representations of physical phenomena. **4.** Blended mode of teaching with a flip classroom approach. **5.** Laboratory experiments and practical demonstrations. **6.** Use of Online resources, educational websites, virtual laboratories, and online textbooks, such as SWAYAM, NPTEL, Amrita Lab and e-Gyan Kosh. **7.** Assessment based upon continuous evaluation including quizzes, assignments projects, presentations, and class tests. **8.** Hands-on training with various instruments (CRO, DSO, Function generator etc.) **9.** Virtual tour of industries.
Semester 4:		
Course Name	**Learning Outcomes**	**Methodology (to achieve specific outcomes)**

Microprocessor and Microcontroller	**CO1:** Designing and developing embedded systems. **CO2:** Major components that constitute an embedded system. **CO3:** The architecture of an 8085 Microprocessor. **CO4:** Assembly language programming essentials **CO5:** A microcontroller, microcomputer embedded system. **CO6:** The architecture of an 8051 microcontroller and its concepts like I/O operations, interrupts, and programming of timers and counters. **CO7:** Interfacing of 8051 microcontroller with peripherals **CO8:** I8051 addressing modes and accessing memory locations using various addressing modes, arithmetic and logic instructions	**1.** Use of Visual aids, such as charts, diagrams, graphs, and pictures, to illustrate abstract concepts in physics. **2.** Use of visual aids to represent scientific principles, formulas, and experimental setups. **3.** Using multimedia resources, including videos, animations, simulations, and interactive software, to provide students with dynamic visual representations of physical phenomena. **4.** Blended mode of teaching with a flip classroom approach. **5.** Laboratory experiments and practical demonstrations. **6.** Use of Online resources, educational websites, virtual laboratories, and online textbooks, such as SWAYAM, NPTEL, Amrita Lab and e-Gyan Kosh. **7.** Assessment based upon continuous evaluation including quizzes, assignments projects, presentations, and class tests. **8.** Hands-on training with various instruments (CRO, DSO, Function generator etc.) **9.** Virtual tour of industries.
Semester 5:		
Course Name	**Learning Outcomes**	**Methodology (to achieve specific outcomes)**

Electronic Instrumentation	**CO1:** Learn Accuracy and precision. Significant figures. Error and uncertainty analysis. Shielding and grounding. Electromagnetic Interference. **CO2:** Students will understand about various Measurement Instruments such as voltmeter, multimeters and understand their precision and accuracy. Measurement of Impedance using various bridges. **CO3:** Gain knowledge about power supply, Line and load regulation, Short circuit protection. Idea of switched mode power supply (SMPS) & uninterrupted power supply(UPS). **CO4:** Oscilloscope, CRT and Digital Storage Oscilloscope **CO5:** Study about multivibrators, oscillators, amplifiers and function generators. **CO6:** Gain basic knowledge of virtual instrumentation and transducers.	**1.** Use of Visual aids, such as charts, diagrams, graphs, and pictures, to illustrate abstract concepts in physics. **2.** Use of visual aids to represent scientific principles, formulas, and experimental setups. **3.** Using multimedia resources, including videos, animations, simulations, and interactive software, to provide students with dynamic visual representations of physical phenomena. **4.** Blended mode of teaching with a flip classroom approach. **5.** Laboratory experiments and practical demonstrations. **6.** Use of Online resources, educational websites, virtual laboratories, and online textbooks, such as SWAYAM, NPTEL, Amrita Lab and e-Gyan Kosh. **7.** Assessment based upon continuous evaluation including quizzes, assignments projects, presentations, and class tests. **8.** Hands-on training with various instruments (CRO, DSO, Function generator etc.) **9.** Virtual tour of industries.
Semester 6:		
Course Name	**Learning Outcomes**	**Methodology (to achieve specific outcomes)**

Photonic Devices and Power Electronics	**CO1:** Develop an understanding of the application of fundamental laws of physics in such optoelectronics areas as telecommunications and power electronics for automation in industries. **CO2:** Acquire essential laboratory skills in designing experiments, assembling standard optical tools for optical experimentation and power electronics and analyzing acquired data. **CO3:** Identify the critical areas in application levels and derive typical alternative solutions, select suitable power converters to control Electrical Motors and other industry-grade apparatus. **CO4:** Develop an understanding to compare the performance and basic operation of various power semiconductor devices, passive components and various switching circuits. **CO5:** Develop an understanding of the Basic circuit of power rectifiers and inverters.	**1.** Use of Visual aids, such as charts, diagrams, graphs, and pictures, to illustrate abstract concepts in physics. **2.** Use of visual aids to represent scientific principles, formulas, and experimental setups. **3.** Using multimedia resources, including videos, animations, simulations, and interactive software, to provide students with dynamic visual representations of physical phenomena. **4.** Blended mode of teaching with a flip classroom approach. **5.** Laboratory experiments and practical demonstrations. **6.** Use of Online resources, educational websites, virtual laboratories, and online textbooks, such as SWAYAM, NPTEL, Amrita Lab and e-Gyan Kosh. **7.** Assessment based upon continuous evaluation including quizzes, assignments projects, presentations, and class tests. **8.** Hands-on training with various instruments (CRO, DSO, Function generator etc.) **9.** Virtual tour of industries.