SEMESTER I

1.1 Mechanics General: Semester 1 CC1/GE1

Course Outcome:

Upon completing this course, students will have a strong foundation in mathematical methods and mechanics. They will be proficient in vector algebra and analysis, able to solve differential equations, and analyze Newtonian mechanics and rotational motion. Students will understand central force and gravitation, oscillations, elasticity, and surface tension, and be able to apply these principles to real-world scenarios. They will develop problem-solving skills and critical thinking, enabling them to analyze and solve complex physics problems. Overall, this course prepares students for advanced studies in physics and related fields, fostering a deep understanding of the fundamental principles governing the behavior of physical systems and their applications in various scientific and engineering domains.

SEMESTER II

2.1 Electricity and Magnetism General: Semester 2 CC2/GE2

Course Outcome:

At the end of this course, students will have a strong grasp of essential vector analysis, electrostatics, magnetism, electromagnetic induction, and electrodynamics. They will be proficient in applying vector algebra and vector analysis principles, calculating electric and magnetic fields for different configurations, and understanding the principles of electromagnetic induction and propagation of electromagnetic waves. Students will develop problem-solving skills and be able to analyze and solve complex problems related to electromagnetism. With this foundational knowledge, they will be well-prepared for advanced studies and research in electromagnetism and related fields, enabling them to contribute to advancements in science, engineering, and technology involving electric and magnetic phenomena.

SEMESTER III

3.1 Thermal Physics and Statistical Mechanics General: Semester 3 CC3/GE3, SEC A

Course Outcome:

By the end of this course, students will have a comprehensive understanding of the fundamental principles of thermodynamics, thermodynamic potentials, kinetic theory of gases, theory of radiation, and statistical mechanics. They will be proficient in applying these concepts to analyze and solve real-world problems related to gases, radiation, and thermodynamic processes. Students will develop critical thinking and analytical skills, allowing them to appreciate the underlying principles governing the behavior of matter and energy. With this solid foundation, they will be well-prepared for advanced studies and research in thermodynamics, statistical mechanics, and related scientific and engineering fields, enabling them to contribute to the advancement of knowledge and technology in these domains.

SKILL ENHANCEMENT COURSE

SEC A-1 (Technical Skill)
3.2 Scientific Writing (Project type)

Course Outcome:

By the end of this course, students will be able to use LaTeX effectively to create professional-looking documents. They will understand the difference between WYSIWYG and WYSIWYM, be proficient in preparing basic LaTeX files, and compile them. Students will also be familiar with different document classes, page layout formatting, list structures, representation of mathematical equations, customization of fonts, writing tables, and handling figures, enabling them to produce well-structured and aesthetically appealing documents using LaTeX.

SEC A-2 (Knowledge Skill)
3.3 Renewable energy and Energy Harvesting (Theory)

Course Outcome:

This course aims to provide students with a comprehensive understanding of various fossil fuels, renewable energy sources, and alternate energy technologies. By the end of the course, students will be able to identify the limitations of fossil fuels and nuclear energy, understand the need for renewable energy, and analyze different non-conventional energy sources. They will gain insights into solar energy, wind energy, ocean energy, geothermal energy, hydro energy, piezoelectric energy harvesting, and electromagnetic energy harvesting. Students will be

equipped with knowledge of sustainable energy solutions, environmental impacts, and the application of various energy technologies.

SEMESTER IV

General: Semester 4 CC4/GE4, SEC B
4.1 Waves and Optics

Course Outcome:

This course aims to provide students with a comprehensive understanding of acoustics, wave optics, interference, diffraction, and polarization. By the end of the course, students will be able to comprehend the concepts of simple harmonic motion, damped, and forced vibrations, and apply Fourier's Theorem to analyze various waveforms. They will understand intensity and loudness of sound, as well as intensity levels in decibels. Students will be able to analyze superposition of vibrations, interference in various setups, and diffraction patterns of light. They will also gain insights into wavefront properties, Huygens' Principle, and polarization of light waves. Overall, this course equips students with a deep understanding of wave phenomena and their practical applications.

SKILL ENHANCEMENT COURSE

SEC B -1 (Technical Skill)
4.2 Arduino (Project type)

Course Outcome:

By the end of this course, students will be able to understand the fundamental concepts of Arduino and its open-source electronics prototyping. They will be familiar with the Arduino board and its setup. Students will gain proficiency in Arduino programming, including data types, variables, constants, operators, control statements, loops, functions, and strings. They will be able to interface with various components using serial communication, digital and analog input/output, and sensors like temperature and ultrasonic sensors. Additionally, students will be equipped with the skills to develop basic Arduino projects, laying the groundwork for further exploration and application of Arduino in real-world projects and electronic prototyping.

SEC B -2 (Knowledge Skill)
4.3 Electrical Circuits and Network skills (Theory)

Course Outcome:

This course aims to equip students with a comprehensive understanding of electrical machines and power systems. By the end of the course, students will be able to analyze and design DC generators and motors, comprehend the operating characteristics of various DC motors, and understand three-phase generators' connections and voltage relationships. They will be familiar with transformers, their types, equivalent circuits, and connections in both single-phase and three-phase systems. Students will gain insights into single-phase AC motors, induction motors, and their speed control techniques. Additionally, they will learn about power measurements using wattmeters and energy meters, protective relay systems, and common switchgear equipment. Overall, this course prepares students for analyzing and designing electrical systems and contributes to their knowledge of power distribution and protection.

SEMESTER V

Discipline Specific Elective" (DSE)

DSE-A(1)
5.1 Analog Electronics
5.1.1 Analog Electronics(Theory)

Course Outcome:

By the end of this course, students will be able to analyze and design circuits using discrete and active components. They will understand the characteristics and applications of semiconductor devices such as diodes, transistors (BJTs and FETs), and operational amplifiers (Op-Amps). Students will be proficient in applying various network theorems, including Thevenin and Norton theorems, to analyze DC circuits. They will also gain insights into regulated power supplies, feedback amplifiers, and sinusoidal oscillators. Overall, this course prepares students to analyze and design electronic circuits, understand the behavior of semiconductor devices and Op-Amps, and apply this knowledge to various practical applications in electronics and circuit design.

DSE A (2)
5.2 Modern Physics
5.2.1 Modern Physics (Theory)

Course Outcome:

This course aims to provide students with a strong foundation in the concepts of quantum mechanics and special theory of relativity. By the end of the course, students will be able to understand the wave-particle duality of matter, the probabilistic interpretation of wave functions, and the principles of quantum mechanics, including the Schrödinger equation and its application to one-dimensional systems. They will gain insights into the postulates of quantum mechanics, the time evolution of wave functions, and the concept of stationary states. Students will also comprehend the basics of special theory of relativity, including Lorentz transformations, time dilation, length contraction, and relativistic dynamics. Additionally, they will understand the principles of lasers and their functioning in various systems. Overall, this course equips students with the fundamental knowledge of quantum mechanics, relativity, and laser technology, laying the groundwork for advanced studies in these fields and their applications in modern physics and technology.

SEMESTER VI

Discipline Specific Elective" (DSE)

DSE B (1)
6.1 Digital Electronics
6.1.1 Digital Electronics (Theory)

Course Outcome:

This course aims to provide students with a comprehensive understanding of integrated circuits (ICs), number systems, digital circuits, data processing circuits, sequential circuits, and registers/counters. By the end of the course, students will be able to analyze and design digital circuits using various gates (AND, OR, NOT, NAND, NOR, XOR, XNOR) and understand their implementation using diodes and transistors. They will be proficient in binary number representation, addition, and subtraction using 1's complement and 2's complement methods. Students will also comprehend the principles of IC design and the advantages and drawbacks of different scale of integration. Additionally, they will be able to design and analyze sequential circuits, registers, and counters, making them proficient in digital system design and data processing.

DSE B (2)
6.2 Nuclear & Particle Physics
6.2.1 Nuclear & Particle Physics (Theory)

Course Outcome:

This course aims to provide students with a comprehensive understanding of nuclear physics and particle physics. By the end of the course, students will be able to analyze the general properties of nuclei, including their constituents, mass, charge density, and binding energy. They will comprehend various nuclear models, such as the liquid drop model and the shell model, and understand nuclear stability and magic numbers. Students will gain insights into radioactivity, including α, β, and γ decay processes, as well as nuclear reactions and their kinematics. They will learn about different types of nuclear detectors and their principles of operation. Additionally, students will be familiar with particle accelerators and particle physics, including fundamental particles, interactions, symmetries, and conservation laws. Overall, this course equips students with the foundational knowledge of nuclear and particle physics, paving the way for further exploration and research in these fields.