Course Code	CS 4XX/6XX
Title of the Course	Green Software: Energy Analysis and Costing
Course Category	Department Elective
Credit Structure	L-T-P–Credits 2-1-0-3
Concerned Department	Computer Science and Engineering
Pre-requisite	Computer Programming, Automata Theory and Logic, Software Engineering, Operating Systems
Objectives	1. To understand and apply techniques for analyzing and optimizing software energy consumption across system layers, from low-level code to complete applications. 2. To develop sustainable and ethically responsible software solutions by integrating energy-efficient design practices and evaluating their societal impact.
Course Outcome	1. Abie to analyze and optimize energy consumption in software systems using modeling, measurement, and low-power design techniques. 2. Develop sustainable software solutions that align with responsible computing principles and address ethical and environmental considerations.
Course Syllabus	**Foundations of Energy-Aware Computing:** Introduction to software energy-costing, environmental impact, Key factors, energy demands, Principles of energy-efficiency **Energy Measurement and Programming Techniques:** Measurement and assessment Tools and Instrumentation, Energy-aware programming, efficient coding practices **Sustainable Software Engineering Practices:** Green software methodologies, Sustainability focussed software lifecycle **Energy-Efficient Platforms and Infrastructure:** Efficient hardware/software systems, Sustainablity Vs data centers and cloud platforms. **Models and Compliance Frameworks:** Regulatory and algorithmic accountability in energy-aware computing, Applied case analyses and emerging technologies in sustainable software systems.
Suggested Books	Textbooks: 1. Noam Nisan and Shimon Schocken, **“The Elements of Computing Systems: Building a Modern Computer from First Principles”**, Second Edition, The MIT Press, USA, 2021, 9780262536576, 2. Giorgos Fagas, Luca Gammaitoni, John P. Gallagher, Douglas J. Paul, **“ICT - Energy Concepts for Energy Efficiency and Sustainability”**, IntechOpen, UK, 2017, 9789535130123 Reference books: 3. Anne Currie, Sarah Hsu, Sara Bergman, “Building Green Software”, O'Reilly Media, 2024, 9781098150624