IC160 Electrical Systems Around Us

Credit: 2.5-0.5-0-3

Prerequisite: Consent of the faculty member

Students intended for: B.Tech

Elective or Core: Core Semester: Even/Odd

Course objective: Develop an understanding of common electrical systems & appliances

Course content:

Common Appliances: Exploring the common appliances, their ratings, power consumption and working. [3 Lectures]

Heating and Lighting: Understanding how illumination and temperature control are integrated in our buildings, types of sources and elements, source transformation, Kirchoff's laws, Mesh and Nodal analysis, Thevenin's theorem, Norton's theorem, superposition theorem, maximum power transfer theorem. Single phase: AC fundamentals, sinusoidal and non-sinusoidal waveforms-average and effective values, form and peak factors, concept of phasors, analysis of series and parallel RLC circuits, power triangle and power factor, resonance in series and parallel circuits, transient analysis of RL and RC circuits, frequency response for RL and RC. Three phase: Three phase emf generation, delta and star connections, balanced supply and balanced load, measurement of power in three phase circuits. Introduction to common earthing practices.

[9 Lectures + 4 Tutorials]

Supply of Electricity: Concepts of magnetic circuits, analogy with electrical circuits, B-H curve, hysteresis and eddy current losses, magnetic circuit calculations. Single-phase transformer: Constructional features, operating principle, emf equation, phasor diagram, equivalent circuit, voltage regulation, efficiency, open and short circuit tests. [10+ Lectures]

Fans and Pump: DC machines: constructional features, working principle, emf and torque equation, armature reaction, types of excitation and generator characteristics. Introduction to three phase induction motor and three-phase synchronous generator. Introduction to renewable energy.

[12 Lectures]

Upcoming topics: Relevant topics related to the current trend can be selected by the instructor.

[2 Lectures]

Text Book

I.J.Nagrath, `Basic Electrical Engineering', Tata McGraw Hill, India

Reference Books

Vincent Del Toro, `Electrical Engineering Fundamental, Prentice Hall

Charles K. Alexander and Matthew N. O. Sadiku, "Fundamentals of Electric Circuits", Tata McGraw Hill, India