

LESSON PLAN

FUNDAMENTALS OF ELECTRICAL & ELECTRONICS ENGINEERING (TH 6)

YEAR: 1ST YEAR

DISCIPLINE: ELECTRICAL ENGINEERING

WEF: 17.08.26 TO 17.04.27

BY: BHUPEN KUMAR PRADHAN

Class/Week	Topics to be covered	Remark
UNIT I: ELECTRIC AND MAGNETIC CIRCUITS (Weeks W1 – W9)		
W1	Introduction to Electrical Engineering: EMF, Current, Potential Difference, Ohm's Law and temperature dependence.	
W2	Concept of electrical source and load, Series circuit connections of V, I, and R with numericals.	
W3	Parallel circuit connections of V, I, and R, Voltage Division Rule and Current Division Rule.	
W4	Electric Power and Energy concepts, Kirchhoff's Current Law (KCL) with numerical problems.	
W5	Kirchhoff's Voltage Law (KVL) and circuit analysis with simple numerical problems.	
W6	Magnetic Circuits: Definitions of M.M.F, magnetic force, magnetic flux, permeability, reluctance, and permeance.	
W7	Electromagnetic Induction: Faraday's Laws, Lenz's Law, Self-inductance, Mutual inductance, and Leakage factor.	
W8	Magnetic Hysteresis loop and B-H curve, Analogy between electric and magnetic circuits.	
W9	AC Fundamentals: Cycle, Frequency, Periodic time, Amplitude, Angular velocity, RMS, Average value, Form Factor, Peak Factor, Phase Angle.	
UNIT II: A.C. CIRCUITS (Weeks W10 – W17)		
W10	Mathematical and phasor representation of alternating EMF and current waveforms.	
W11	Three-phase systems: Voltage and Current relationships in Star (Y) connection with derivation.	
W12	Three-phase systems: Voltage and Current relationships in Delta (Δ) connection with derivation.	
W13	AC through Pure Resistance (R) circuit: Phasor representation, wave diagrams, and power calculation.	
W14	AC through Pure Inductance (L) circuit: Inductive reactance, phasor representation, and power calculation.	
W15	AC through Pure Capacitance (C) circuit: Capacitive reactance, phasor representation, and power calculation.	
W16	Impedance concept in R-L, R-C, and R-L-C series circuits with phasor diagrams.	
W17	Power Triangle, Power Factor definition & significance, Real power (kW), Reactive power (kVAR), and Apparent power (kVA).	
UNIT III: TRANSFORMER AND DC MACHINES (Weeks W18 – W25)		
W18	Fundamentals of Electrical Machines: Fleming's Right-Hand Rule and Fleming's Left-Hand Rule applications.	
W19	DC Machines: Constructional details (Yoke, Poles, Armature, Commutator, Brushes) and working principle.	
W20	EMF equation derivation for DC Generators and DC Motors with numerical problems.	
W21	Applications of DC Generators and DC Motors in industrial and domestic fields.	
W22	Transformers: Operating principle of mutual induction, general constructional features (Core type & Shell type).	
W23	Classification and principle of different types of transformers (Step-up, Step-down, Auto-transformer).	
W24	EMF Equation of single-phase transformer derivation and transformation ratio (K).	
W25	Simple numerical problems on EMF equation, turns ratio, current ratio, and transformer voltage ratio.	
UNIT IV: MEASURING INSTRUMENTS, WIRING & POWER BILLING (Weeks W26 – W32)		
W26	Measuring Instruments: Introduction, classification, and operating torques (Deflecting, Controlling, Damping torque concepts).	
W27	PMMC Instruments: Working principle, construction, features, scale, and applications (DC Ammeter & Voltmeter).	
W28	MI Instruments: Attraction and Repulsion type Moving Iron instruments, features, and applications (AC/DC).	
W29	Single-phase Wattmeter and Energy Meter: Connection diagrams, operating principles, and practical uses.	
W30	Domestic Wiring: Types of wiring systems (Cleave, Wooden casing-capping, CTS/TRS, Conduit wiring concept).	
W31	Power Billing: Energy consumption calculation methods, load assessment in kilowatt-hours (kWh).	
W32	Energy consumption calculations in small domestic electric installations with numerical power billing problems.	

Course Outcome-

CO:1	Acquire knowledge on Electrical and magnetic circuit parameters & AC circuits.
CO:2	Basic analysis of Machines & Transformer.
CO:3	Analyze measuring instruments, domestic wiring, and apply the knowledge for power billing calculations.

Bhupen Kumar Pradhan
08-09-2026

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21-07-2026