

GOVT. POLYTECHNIC MAYURBHANJ

LESSON PLAN

Discipline: Mechatronics Engineering

Year / Semester: 1st Year

Subject: Fundamentals of Electrical & Electronics Engineering

No. of Days per week class allotted: 02

Semester From date: 17.08.2026

To Date: 17.04.2027

Name of the Faculty – Manoj Kumar Pradhan

MONTH	Week	Day	UNIT	TOPICS
August	3	2	1	EMF, Current, Potential Difference – definitions; Ohm's law and its relation with temperature
	3	4	1	Concept of source and load; relation of V, I, R in series and parallel circuits
	4	2	1	Voltage and current division rule; Power and Energy
	5	2	1	KCL, KVL – simple problems
September	1	4	1	M.M.F, magnetic force, flux, permeability, reluctance, permeance
	1	2	1	Electromagnetic induction, Faraday's laws of electromagnetic induction, Lenz's law
	2	4	1	Self and mutual inductance, leakage factor
	3	2	1	Hysteresis loop and BH curve; analogy between electric and magnetic circuits
	4	4	1	AC fundamentals: cycle, frequency, periodic time, amplitude, angular velocity, RMS value, average value, form factor, peak factor, phase angle
	4	2	5	Passive & Active Components: Resistances, Capacitors, Inductors – concept and simple problems
	5	4	5	Diodes, Transistors and their applications
October	1	2	5	Energy bands in solids; types of materials (insulator, semiconductor, conductor)
	1	4	5	Intrinsic and extrinsic semiconductors
	2	2	5	Diode: definition, classification and working – PN junction, LED
	2	4	5	Diode: Zener diode – definition, classification and working
	3	4	5	Transistor: BJT, concept of FET, MOS and CMOS (definition, types, symbol & terminals)
	4	2	2	Mathematical representation of alternating EMF and current
	4	4	2	Phasor representation of alternating EMF and current
November	1	2	2	Voltage and current relationship in Star connection (derivation)
	1	4	2	Voltage and current relationship in Delta connection (derivation)
	2	2	2	Impedance; A.C. in R circuit and L circuit with phasor diagram
	2	4	2	A.C. in C circuit with phasor diagram; power triangle
	3	2	2	Power factor; concept of real, reactive and apparent power with units
	3	4	2	Numerical problems on A.C. circuits (R, L, C, Power)
	4	2	2	Internal Assessment 1
	4	4	6	DC/AC, voltage/current, periodic/non-periodic signals
	5	2	6	Average, RMS, peak values; different types of signal waveforms
December	1	4	6	Analog & Digital Signals: definitions & differences
	1	2	6	Ideal/non-ideal voltage/current sources; independent/dependent voltage-current sources

MONTH	Week	Day	UNIT	TOPICS
	2	4	6	Diode as rectifier: Half wave rectifier
	2	2	6	Diode as rectifier: Full wave rectifier (centre-tapped & bridge)
	3	4	6	Introduction to Clippers & Clampers (definitions only)
	3	2	6	Transistor (BJT) as an amplifier; working of RC coupled amplifier; Oscillator (definition & types)
	4	4	7	Introduction to ICs – advantages & uses
	4	2	7	741 IC pin configuration; Operational Amplifiers – characteristics of Ideal Op-Amp
	5	4	7	Open loop and closed loop configuration of Op-Amp
January	1	2	7	Application of Op-Amp as amplifier: Adder
	1	4	7	Application of Op-Amp: Differentiator
	2	2	7	Application of Op-Amp: Integrator
	2	4	7	Numerical problems / revision on Op-Amp applications
	3	2	3	Fleming's rules; construction and working principle of DC machines
	3	4	3	EMF equations of DC machines and applications
	4	2	3	General construction and principle of different types of transformers
	4	4	3	Construction and principle of single-phase transformer (continued)
February	1	2	3	EMF equation of transformer (single phase)
	1	4	3	Transformation ratio of transformer
	2	2	3	Internal Assessment 2
	2	4	3	Numerical problems on transformer (EMF equation & transformation ratio)
	3	2	3	Revision and numerical practice – Unit III
	3	4	4	Introduction to measuring instruments; types of torques (concept only)
	4	2	4	PMMC and MI type instruments – Ammeter and Voltmeter with connection diagram
	4	4	4	PMMC and MI type instruments – Wattmeter and Energy meter with connection diagram
March	1	2	4	Types of wiring for domestic installation (concept only)
	1	4	4	Calculation of energy consumption in a small domestic electric installation – numerical problems (Part 1)
	2	2	4	Calculation of energy consumption – numerical problems (Part 2)
	2	4	4	Revision and numerical practice – Unit IV
	3	2	8	Number Systems: Binary, Octal, Hexadecimal
	3	4	8	Simple problems on Number system conversions
	4	2	8	Introduction to Logic Gates (circuit symbol & truth table)
	4	4	8	Universal Logic gates
	5	2	8	De Morgan's Law
	5	4	8	Implementation of Boolean expression using logic gates (Part 1)
April	1	2	8	Implementation of Boolean expression using logic gates (Part 2) – simple problems
	1	4	8	Numerical problems / revision – Unit VIII
	2	2	8	Internal Assessment 3
	2	4	8	Revision

Total No. of Classes - 62