

Government Polytechnic, Balangir

Department of Department of Electrical Engineering

LESSON PLAN 2026-27(WINTER)

NAME OF THE Faculty : Subodh Kanta Barik

Subject: TH:4- DC MACHINES AND TRANSFORMERS

Program: Diploma in Electrical Engineering

Semester: 3rd

Total Contact Hours: 45

Total Marks: 100

Assessment: Internal Assessment – 30, End Term – 70

COURSE OUTCOMES:

CO1 Explain the construction and working principle of DC machines.

CO2 Describe the performance characteristics of DC motors and generators.

CO3 Explain the construction and working principle of transformers.

CO4 Describe the performance of single-phase and three-phase transformers.

CO5 Discuss special purpose transformers.

Period	Unit	Topic	Learning Objectives	Activity	Course Outcome	Learning Methodology	Homework
1	I	Introduction to DC Machines	Explain the construction and applications of DC machines	Lecture & discussion	CO1	Interactive lecture with PPT	Read construction of DC generator
2	I	Construction, Parts & Materials	Identify different parts and their functions	Component identification	CO1	Chalk & board + models	Draw labelled diagram
3	I	Principle of Operation	Explain electromagnetic induction	Animation & derivation	CO1	Lecture + demonstration	Practice numerical problems
4	I	Fleming's Right Hand Rule	Apply the rule for direction of induced emf	Classroom activity	CO1	Demonstration	Solve practice questions
5	I	EMF Equation of DC Generator	Derive EMF equation	Numerical solving	CO1	Problem-solving	Derive equation
6	I	Types of DC Generators	Differentiate various generators	Diagram discussion	CO1	PPT	Draw connection
7	I	Armature Reaction	Explain causes and effects	Illustration	CO1	Interactive lecture	Short notes
8	I	Commutation	Explain commutation process	Video demonstration	CO1	ICT-based learning	Write advantages of
9	I	Applications & Revision	Identify industrial applications	Quiz	CO1	Discussion	Unit-I assignment
10	II	Types of DC Motors	Classify DC motors	Lecture	CO2	Interactive lecture	Study motor
11	II	Fleming's Left Hand Rule	Apply motor principle	Demonstration	CO2	Activity-based	Practice
12	II	Back EMF	Explain significance	Numerical examples	CO2	Lecture	Solve numericals
13	II	Voltage Equation	Derive voltage equation	Board work	CO2	Problem solving	Practice derivation
14	II	Torque in DC Motor	Explain armature torque	Numerical solving	CO2	Lecture	Solve examples
15	II	Speed Characteristics	Relate speed with load	Graph plotting	CO2	Interactive lecture	Plot
16	II	Losses & Efficiency	Calculate efficiency	Numerical practice	CO2	Problem-solving	Solve efficiency
17	II	DC Motor Starters	Explain necessity and types	Demonstration	CO2	Model demonstration	Compare starters
18	II	Speed Control & BLDC Motor	Explain speed control methods	Video presentation	CO2	ICT + Discussion	Assignment
19	III	Types of Transformers	Differentiate shell and core type	Lecture	CO3	PPT	Draw diagrams
20	III	Construction & Parts	Explain construction	Transformer model study	CO3	Demonstration	Label parts
21	III	Core Materials	Compare CRGO, CRNGO, HRGO	Discussion	CO3	Interactive lecture	Prepare notes
22	III	Working Principle	Explain mutual induction	Demonstration	CO3	Lecture	Study principle
23	III	EMF Equation	Derive transformer EMF equation	Numerical solving	CO3	Problem solving	Practice derivation
24	III	Transformation Ratio	Calculate voltage ratio	Examples	CO3	Lecture	Numerical

25	III	Ratings & Leakage Reactance	Explain ratings	Discussion	CO3	Interactive	Assignment
26	III	Phasor Diagram	Draw no-load & on-load phasor diagram	Board practice	CO3	Lecture	Draw phasor diagrams
27	III	Equivalent Circuit	Develop equivalent circuit	Problem solving	CO3	Lecture	Numerical problems
28	III	Voltage Regulation & Efficiency	Calculate regulation and efficiency	Numerical solving	CO3	Problem solving	Assignment
29	IV	Three Phase Transformer Bank	Explain transformer connections	Diagram discussion	CO4	PPT	Draw Y-Y, Δ - Δ etc.
30	IV	Single Unit Three Phase Transformer	Explain construction	Lecture	CO4	Interactive	Notes
31	IV	Distribution Transformer	Explain construction and cooling	Video	CO4	ICT learning	Compare distribution & Assignment
32	IV	Power Transformer	Explain applications	Discussion	CO4	Lecture	Assignment
33	IV	Selection Criteria	Explain selection parameters	Case study	CO4	Activity-based	Short notes
34	IV	Parallel Operation	Explain need	Lecture	CO4	Discussion	Assignment
35	IV	Conditions for Parallel Operation	Explain conditions	Numerical examples	CO4	Problem solving	Practice questions
36	IV	Polarity & Phasing Tests	Explain testing procedures	Demonstration	CO4	Practical demonstration	Prepare test procedure
37	V	Auto Transformer	Explain construction and working	Lecture	CO5	PPT	Draw diagram
38	V	Applications of Auto Transformer	Identify applications	Discussion	CO5	Interactive	Assignment
39	V	Three Phase Auto Transformer	Explain operation	Lecture	CO5	Demonstration	Study notes
40	V	Isolation Transformer	Explain construction	Lecture	CO5	Interactive	Prepare notes
41	V	Applications of Isolation Transformer	Explain industrial uses	Case discussion	CO5	Activity	Assignment
42	V	Unit-V Revision	Review important concepts	Quiz	CO5	Discussion	Prepare for test
43	All	Numerical Practice	Solve comprehensive problems	Problem solving	CO1-CO5	Practice session	Complete worksheet
44	All	Comprehensive Revision	Revise all five units	Question-answer session	CO1-CO5	Interactive discussion	Final revision
45	All	Class Test & Feedback	Assess learning outcomes	Written test & discussion	CO1-CO5	Assessment	Prepare for end


Signature of Faculty


Signature of HOD