

# DEPARTMENT OF ELECTRICAL ENGINEERING

## Govt. Polytechnic Jajpur, Ragadi

### LESSON PLAN FOR ACADEMIC SESSION - 2024-25 ENERGY CONVERSION-I

<b>Course Code : TH.1</b>	<b>Semester : 4th</b>
<b>Total Periods : 75 Periods</b>	<b>Examination : 3 Hours</b>
<b>Lecture Periods : 4 P/Week</b>	<b>Internal Assessment : 20 Marks</b>
<b>Tutorial : 1P/week</b>	<b>End Semester Examination : 80 Marks</b>
<b>Maximum Marks : 100</b>	
<b>Semester From Date : 04/02/2025 To Date : 17/05/2025</b>	
<b>Name of Teaching Faculty: Mrs. Jyotirmayee Sethy (Lect. Electrical)</b>	

WEEK	PERIOD	TOPIC
1 <sup>st</sup>	1 <sup>st</sup>	<b>Introduction to electrical machine</b> D.C Generator
	2 <sup>nd</sup>	Explain principle of operation , Explain Constructional feature
	3 <sup>rd</sup>	Armature winding, back pitch, Front pitch, Resultant pitch and commutator- pitch.
	4 <sup>th</sup>	Simple Lap and wave winding (problems on winding diagram)
	5 <sup>th</sup>	Explain Different types of D.C. machines i.e. Shunt, Series machine with problem solving methods.
2 <sup>nd</sup>	1 <sup>st</sup>	Explain Different types of D.C. machines i.e. Compound machine with problem solving methods.
	2 <sup>nd</sup>	Derive EMF equation of DC generators. (Solve problems)
	3 <sup>rd</sup>	Explain Armature reaction in D.C. machine.
	4 <sup>th</sup>	Explain commutation in D.C. machine.
	5 <sup>th</sup>	Explain Methods of improving commutation (Resistance and emf commutation)
3 <sup>rd</sup>	1 <sup>st</sup>	Explain role of inter poles and compensating winding. (solve problems)
	2 <sup>nd</sup>	Characteristics of D.C. Generators with problem solving methods
	3 <sup>rd</sup>	Characteristics of D.C. Generators with problem solving methods
	4 <sup>th</sup>	State application of different types of D.C. Generators.
	5 <sup>th</sup>	Concept of critical resistance causes of failure of development of emf.
4 <sup>th</sup>	1 <sup>st</sup>	Explain losses of D.C. machines & numerical problems.
	2 <sup>nd</sup>	Explain efficiency of D.C. machines, condition for maximum efficiency and numerical problems.
	3 <sup>rd</sup>	Explain parallel operation of D.C. Generators.
	4 <sup>th</sup>	Explain parallel operation of D.C. Generators.
	5 <sup>th</sup>	Introduction to D. C. MOTORS
5 <sup>th</sup>	1 <sup>st</sup>	Explain basic working principle of DC motor
	2 <sup>nd</sup>	State Significance of back emf in D.C. Motor.

	3 <sup>rd</sup>	Derive voltage equation of Motor
	4 <sup>th</sup>	Derive torque (Equation of Armature Torque and shaft Torque) (solve problems)
	5 <sup>th</sup>	Explain performance characteristics of shunt motors and their application. (Solve problems)
6 <sup>th</sup>	1 <sup>st</sup>	Explain performance characteristics of series motors and their application. (Solve problems)
	2 <sup>nd</sup>	Explain performance characteristics of compound motors and their application. (Solve problems)
	3 <sup>rd</sup>	Explain methods of starting shunt, series and compound motors, (solve problems)
	4 <sup>th</sup>	Solve problems on dc motors.
	5 <sup>th</sup>	Explain speed control of D.C shunt motors by Flux control method
7 <sup>th</sup>	1 <sup>st</sup>	Armature voltage (rheostatic) Control method.
	2 <sup>nd</sup>	Solve problems on speed control of D.C shunt motors .
	3 <sup>rd</sup>	Explain speed control of series motors by Flux control method.
	4 <sup>th</sup>	Explain speed control of series motors by series parallel method.
	5 <sup>th</sup>	Explain determination of efficiency of D.C. Machine by break test method.
8 <sup>th</sup>	1 <sup>st</sup>	Explain determination of efficiency of D.C. Machine by Swinburne's Test method.
	2 <sup>nd</sup>	Explain Losses & efficiency
	3 <sup>rd</sup>	Explain condition for maximum power.
	4 <sup>th</sup>	Solve numerical problems on losses, efficiency and maximum power.
	5 <sup>th</sup>	<b>SINGLE PHASE TRANSFORMER</b> Explain working principle of transformer.
9 <sup>th</sup>	1 <sup>st</sup>	Explains Transformer Construction – Arrangement of core & winding in different types of transformer
	2 <sup>nd</sup>	Brief ideas about transformer accessories such as conservator, tank, breather explosion vent etc.
	3 <sup>rd</sup>	Explain types of cooling methods
	4 <sup>th</sup>	State the procedures for Care and maintenance
	5 <sup>th</sup>	Derive EMF equation
10 <sup>th</sup>	1 <sup>st</sup>	Ideal transformer voltage transformation ratio
	2 <sup>nd</sup>	Explain Transformer on no load and on load phasor diagrams.
	3 <sup>rd</sup>	Explain phasor diagram of transformer with winding Resistance and Magnetic leakage. Phasor diagram on load using upf, leading pf and lagging pf.
	4 <sup>th</sup>	Explain Equivalent circuit and solve numerical problems.
	5 <sup>th</sup>	Calculate Approximate & exact voltage drop of a Transformer.
11 <sup>th</sup>	1 <sup>st</sup>	Calculate Regulation of various loads and power factor.
	2 <sup>nd</sup>	Explain Different types of losses in a Transformer.
	3 <sup>rd</sup>	Solve problems on losses of transformer.
	4 <sup>th</sup>	Explain Open circuit test.
	5 <sup>th</sup>	Explain Short circuit test.

12 <sup>th</sup>	1 <sup>st</sup>	Explain Efficiency, efficiency at different loads and power factors, condition for maximum efficiency (solve problems)
	2 <sup>nd</sup>	Explain All Day Efficiency
	3 <sup>rd</sup>	Solve problems on all day efficiency.
	4 <sup>th</sup>	Explain determination of load corresponding to Maximum efficiency.
	5 <sup>th</sup>	Explain parallel operation of single phase transformer
13 <sup>th</sup>	1 <sup>st</sup>	<b>AUTO TRANSFORMER</b> Explain constructional features
	2 <sup>nd</sup>	Explain Working principle of single phase Auto Transformer.
	3 <sup>rd</sup>	State Comparison of Auto transformer with an two winding transformer (saving of Copper)
	4 <sup>th</sup>	State Comparison of Auto transformer with an two winding transformer (saving of Copper)
	5 <sup>th</sup>	State Uses of Auto transformer.
14 <sup>th</sup>	1 <sup>st</sup>	Explain Tap changer with transformer (on load and off load condition)
	2 <sup>nd</sup>	<b>INSTRUMENT TRANSFORMERS</b> Explain Current Transformer
	3 <sup>rd</sup>	Potential Transformer
	4 <sup>th</sup>	Define Ratio error, Phase angle error, Burden
	5 <sup>th</sup>	Define Ratio error, Phase angle error, Burden
15 <sup>th</sup>	1 <sup>st</sup>	Uses of C.T. and P.T.
	2 <sup>nd</sup>	Tutorial
	3 <sup>rd</sup>	Tutorial
	4 <sup>th</sup>	Tutorial
	5 <sup>th</sup>	Tutorial

Jyoti K. Mayekar  
 DT - 04/02/2025