

# LESSON PLAN

DISCIPLINE: <b>ELECTRICAL ENGINEERING</b>	Semester: <b>5<sup>th</sup></b>	Name of the Teaching Faculty: <b>Er.M.R.Pati</b>
Subject : <b>ENERGY CONVERSION -II</b>	No of Days / per week class allotted: <b>4</b>	Semester From date: <b>01.08.2023–23.11.2023</b>
<b>Week</b>	<b>Class Day</b>	<b>Topics</b>
<b>1<sup>st</sup></b>	1st	<b>1. ALTERNATOR:</b> Types of alternator and their constructional features
	2nd	Basic working principle of alternator and the relation between speed and frequency
	3rd	Terminology in armature winding and expressions for winding factors (Pitch factor, Distribution factor)
	4th	Explain harmonics, its causes and impact on winding factor.
<b>2<sup>nd</sup></b>	1st	E.M.F equation of alternator
	2nd	Numerical on winding factors and E.M.F equation
	3rd	Explain Armature reaction and its effect on EMF at different power factor of load
	4th	The vector diagram of loaded alternator
<b>3<sup>rd</sup></b>	1st	Testing of alternator Open circuit test & Short circuit test
	2nd	Numerical on vector diagram & tests.
	3rd	Determination of voltage regulation of Alternator by direct loading and synchronous impedance method.
	4th	Numerical on regulation.
<b>4<sup>th</sup></b>	1st	Parallel operation of alternator using synchro-scope and dark & bright lamp method.
	2nd	Explain distribution of load by parallel connected alternators.
	3rd	<b>2. SYNCHRONOUS MOTOR:</b> Constructional feature of Synchronous Motor. Principles of operation, concept of load angle
	4th	Derive torque, power developed
<b>5<sup>th</sup></b>	1st	Effect of varying load with constant excitation
	2nd	Effect of varying excitation with constant load
	3rd	Power angle characteristics of cylindrical rotor motor.
	4th	Explain effect of excitation on Armature current and power factor

6 <sup>th</sup>	1st	Hunting in Synchronous Motor. Function of Damper Bars in synchronous motor and gen
	2nd	Describe method of starting of Synchronous motor
	3rd	State application of synchronous motor
	4th	<b>3. THREE PHASE INDUCTION MOTOR:</b> Production of rotating magnetic field.
7 <sup>th</sup>	1st	Constructional feature of Squirrel cage and Slip ring induction motors. Working principles of operation of 3-phase Induction motor
	2nd	Define slip speed, slip and establish the relation of slip with rotor quantities.
	3rd	Derive expression for torque during starting and running conditions and derive conditions for maximum torque.
	4th	Numerical on torque.
8 <sup>th</sup>	1st	Torque-slip characteristics. Derive relation between full load torque and starting torque etc.
	2nd	Numerical on torque relationship.
	3rd	Establish the relations between Rotor Copper loss, Rotor output and Gross Torque and relationship of slip with rotor copper loss.
	4th	Numerical on power stages.
9 <sup>th</sup>	1st	Methods of starting and different types of starters used for three phase Induction motor
	2nd	Explain speed control by Voltage Control, Rotor resistance control, Pole changing, frequency control methods.
	3rd	Plugging as applicable to three phase induction motor.
	4th	Describe different types of motor enclosures. Explain principle of Induction Generator and state its applications
10 <sup>th</sup>	1st	<b>4. SINGLE PHASE INDUCTION MOTOR:</b> Explain Ferrari's principle
	2nd	Explain double revolving field theory and Cross-field theory to analyze starting torque of 1-phase induction motor
	3rd	Split phase motor.
	4th	Capacitor Start motor
11 <sup>th</sup>	1st	Capacitor start, capacitor run motor.
	2nd	Permanent capacitor type motor
	3rd	Shaded pole motor.
	4th	Explain the method to change the direction of rotation of above motors.
12 <sup>th</sup>	1st	<b>5. COMMUTATOR MOTORS:</b> Construction, working principle
	2nd	Running characteristic and application of single phase series motor.
	3rd	Construction, working principle and application of Universal motors
	4th	Working principle of Repulsion start Motor.
13 <sup>th</sup>	1st	Working principle of Repulsion start Induction run motor,
	2nd	Working principle of Repulsion Induction motor
	3rd	<b>6. SPECIAL ELECTRICAL MACHINE:</b> Principle of Stepper motor. Classification of Stepper motor
	4th	Principle of variable reluctance stepper motor

14 <sup>th</sup>	1st	Principle of Permanent magnet stepper motor
	2nd	Principle of hybrid stepper motor.
	3rd	Applications of Stepper motor
	4th	<b>7. THREE PHASE TRANSFORMERS:</b> Explain Grouping of winding, Advantages.
15 <sup>th</sup>	1st	Explain parallel operation of the three phase transformers
	2nd	Explain tap changer (On/Off load tap changing)
	3rd	Explain tap changer (On/Off load tap changing)
	4th	Maintenance Schedule of Power Transformers