LESSON PLAN FOR ENERGY CONVERSION – II (Th.- 2)

Discipline: Electrical Engineering	Semester: 5th	Name of the Teaching Faculty: CHANDRAMANI MAHAPATRA (Lect.)
Subject: ENERGY CONVERSI-ON – II	No. of days/ per week class allotted: 4	Semester From Date : 01.07.2024 to Date: 08.11.2024 No. of Weeks: 15
Week	**Class Day**	**Theory**
1st		**1. ALTERNATOR:**
	1st	1.1. Types of alternator and their constructional features
	2nd	1.2. Basic working principle of alternator and the relation between speed and frequency.
	3rd	1.3. Terminology in armature winding and expressions for winding factors (Pitch factor, Distribution factor).
	4th	1.4. Explain harmonics, its causes and impact on winding factor.
2nd	1st	1.5. E.M.F equation of alternator. (Solve numerical problems).
	2nd	1.6. Explain Armature reaction and its effect on emf at different power factor of load.
	3rd	1.7. The vector diagram of loaded alternator.
	4th	1.7. The vector diagram of loaded alternator. (Solve numerical problems)
3rd	1st	1.8. Testing of alternator 1.8.1. Open circuit test. 1.8.2. Short circuit test.
	2nd	1.8. Testing of alternator (Solve numerical problems)
	3rd	1.9. Determination of voltage regulation of Alternator by direct loading and synchronous impedance method.
	4th	1.9. Determination of voltage regulation of Alternator by direct loading and synchronous impedance method. (Solve numerical problems)
4th	1st	1.10. Parallel operation of alternator using synchro-scope and dark & bright lamp method.
	2nd	1.11. Explain distribution of load by parallel connected alternators.
		2. SYNCHRONOUS MOTOR:
	3rd	2.1. Constructional feature of Synchronous Motor. 2.2. Principles of operation, concept of load angle
	4th	2.3. Derive torque, power developed.
5th	1st	2.4. Effect of varying load with constant excitation.
	2nd	2.5. Effect of varying excitation with constant load.
	3rd	2.6. Power angle characteristics of cylindrical rotor motor.
	4th	2.7. Explain effect of excitation on Armature current and power factor
6th	1st	2.8. Hunting in Synchronous Motor. 2.9. Function of Damper Bars in synchronous motor and generator.
	2nd	2.10. Describe method of starting of Synchronous motor. 2.11. State application of synchronous motor.

		3. THREE PHASE INDUCTION MOTOR:
	3rd	3.1. Production of rotating magnetic field.
	4th	3.2. Constructional feature of Squirrel cage and Slip ring induction motors.
7th	1st	3.3. Working principles of operation of 3-phase Induction motor.
	2nd	3.4. Define slip speed, slip and establish the relation of slip with rotor quantities.
	3rd	3.5. Derive expression for torque during starting and running conditions and derive conditions for maximum torque.
	4th	3.5. Derive expression for torque during starting and running conditions and derive conditions for maximum torque. (solve numerical problems)
8th	1st	3.6. Torque-slip characteristics.
	2nd	3.7. Derive relation between full load torque and starting torque etc. (solve numerical problems)
	3rd	3.8. Establish the relations between Rotor Copper loss, Rotor output and Gross Torque and relationship of slip with rotor copper loss. (solve numerical problems)
	4th	3.9. Methods of starting and different types of starters used for three phase Induction motor.
9th	1st	3.10. Explain speed control by Voltage Control, Rotor resistance control, Pole changing, frequency control methods.
	2nd	3.11. Plugging as applicable to three phase induction motor.
	3rd	3.12. Describe different types of motor enclosures.
	4th	3.13. Explain principle of Induction Generator and state its applications.
		4. SINGLE PHASE INDUCTION MOTOR:
10th	1st	4.1. Explain Ferrari's principle.
	2nd	4.2. Explain double revolving field theory and Cross-field theory to analyze starting torque of 1-phase induction motor.
	3rd	4.2. Explain double revolving field theory and Cross-field theory to analyze starting torque of 1-phase induction motor. (cont.)
	4th	4.3. Explain Working principle, Torque speed characteristics, performance characteristics and application of following single phase motors. 4.3.1. Split phase motor.
11th	1st	4.3.2. Capacitor Start motor. 4.3.3. Capacitor start, capacitor run motor.
	2nd	4.3.4. Permanent capacitor type motor. 4.3.5. Shaded pole motor.
	3rd	4.4. Explain the method to change the direction of rotation of above motors.
	4th	4.4. Explain the method to change the direction of rotation of above motors(cont.)
		5. COMMUTATOR MOTORS:
12th	1st	5.1. Construction, working principle, running characteristic and application of single phase series motor.
	2nd	5.1. Construction, working principle, running characteristic and application of single phase series motor.(cont.)
	3rd	5.2. Construction, working principle and application of Universal

		motors.
	4th	5.2. Construction, working principle and application of Universal motors. (cont.)
13th	1st	5.3. Working principle of Repulsion start Motor
	2nd	5.3. Working principle of Repulsion start Induction run motor, Repulsion Induction motor.
		6. SPECIAL ELECTRICAL MACHINE:
	3rd	6.1. Principle of Stepper motor. 6.2. Classification of Stepper motor.
	4th	6.3. Principle of variable reluctant stepper motor.
14th	1st	6.4. Principle of Permanent magnet stepper motor.
	2nd	6.5. Principle of hybrid stepper motor.
	3rd	6.6. Applications of Stepper motor.
		7. THREE PHASE TRANSFORMERS:
	4th	7.1. Explain Grouping of winding, Advantages.
15th	1st	7.2. Explain parallel operation of the three phase transformers.
	2nd	7.3. Explain tap changer (On load tap changing)
	3rd	7.3. Explain tap changer (Off load tap changing)
	4th	7.4. Maintenance Schedule of Power Transformers.

29/06/24

Signature of Faculty

29/06/24

Head of Department

29/06/24

Academic co-ordinator