

Discipline: <b>ELECTRICAL</b>	Semester: 5 <sup>th</sup> Sem	Name of the Teaching Faculty: <b>MRS. MONALISA PANI</b>
Subject: <b>ENERGY CONVERSION-II</b>	No. of days/per week class allotted: 4p/week	Semester From: 15.09.2022 to 22.12.2022 No. of weeks: 15 weeks
Week	Class Day	Theory Topics
1 <sup>st</sup>	1 <sup>st</sup>	<b>1. ALTERNATOR:</b>
		1.1. Types of alternator and their constructional features.
	2 <sup>nd</sup>	1.2. Basic working principle of alternator and the relation between speed and frequency.
	3 <sup>rd</sup>	1.3. Terminology in armature winding and expressions for winding factors (Pitch factor, Distribution factor).
	4 <sup>th</sup>	1.4. Explain harmonics, its causes and impact on winding factor.
2 <sup>nd</sup>	1 <sup>st</sup>	1.5. E.M.F equation of alternator. (Solve numerical problems).
	2 <sup>nd</sup>	1.5. E.M.F equation of alternator. (Solve numerical problems).
	3 <sup>rd</sup>	1.6. Explain Armature reaction and its effect on emf at different power factor of load.
	4 <sup>th</sup>	1.7. The vector diagram of loaded alternator. (Solve numerical problems)
3 <sup>rd</sup>	1 <sup>st</sup>	1.8. Testing of alternator (Solve numerical problems)
		1.8.1. Open circuit test.
	2 <sup>nd</sup>	1.8.2. Short circuit test.
	3 <sup>rd</sup>	1.9. Determination of voltage regulation of Alternator by direct loading and synchronous impedance method. (Solve numerical problems)
	4 <sup>th</sup>	1.9. Determination of voltage regulation of Alternator by direct loading and Synchronous impedance method. (Solve numerical problems)
4 <sup>th</sup>	1 <sup>st</sup>	1.10. Parallel operation of alternator using synchro-scope and dark & Bright lamp method.
	2 <sup>nd</sup>	1.11. Explain distribution of load by parallel connected alternators.
	3 <sup>rd</sup>	<b>2. SYNCHRONOUS MOTOR:</b>
		2.1. Constructional feature of Synchronous Motor.
		2.2. Principles of operation, concept of load angle
	4 <sup>th</sup>	2.3. Derive torque, power developed.

5 <sup>th</sup>	1 <sup>st</sup>	2.4. Effect of varying load with constant excitation.
		2.5. Effect of varying excitation with constant load.
	2 <sup>nd</sup>	2.6. Power angle characteristics of cylindrical rotor motor.
	3 <sup>rd</sup>	2.7. Explain effect of excitation on Armature current and power factor.
	4 <sup>th</sup>	2.8. Hunting in Synchronous Motor. 2.9. Function of Damper Bars in synchronous motor and generator. Class Test
6 <sup>th</sup>	1 <sup>st</sup>	2.10. Describe method of starting of Synchronous motor.
	2 <sup>nd</sup>	2.11. State application of synchronous motor.
	3 <sup>rd</sup>	<b>3. THREE PHASE INDUCTION MOTOR:</b>
	4 <sup>th</sup>	3.1. Production of rotating magnetic field. 3.2. Constructional feature of Squirrel cage and Slip ring induction motors.
7 <sup>th</sup>	1 <sup>st</sup>	3.3. Working principles of operation of 3-phase Induction motor.
	2 <sup>nd</sup>	3.4. Define line slip speed, slip and establish the relation of slip with rotor quantities.
	3 <sup>rd</sup>	3.5. Derive expression for torque during starting and running conditions and derive conditions for maximum torque. (solve numerical problems)
	4 <sup>th</sup>	3.6. Torque-slip characteristics.
8 <sup>th</sup>	1 <sup>st</sup>	3.7. Derive relation between full load torque and starting torque etc. (solve numerical problems)
	2 <sup>nd</sup>	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)
	3 <sup>rd</sup>	3.9. Methods of starting and different types of starters used for three phase Induction motor.
	4 <sup>th</sup>	3.10. Explain speed control by Voltage Control, Rotor resistance control, Pole changing, frequency control methods.
9 <sup>th</sup>	1 <sup>st</sup>	3.10. Explain speed control by Voltage Control, Rotor resistance control, Pole changing, frequency control methods.
	2 <sup>nd</sup>	3.11. Plugging as applicable to three phase induction motor.
	3 <sup>rd</sup>	3.12. Describe different types of motor enclosures.
	4 <sup>th</sup>	3.13. Explain principle of Induction Generator and state its applications.
10 <sup>th</sup>	1 <sup>st</sup>	<b>4. SINGLE PHASE INDUCTION MOTOR:</b> 4.1. Introduction and Explain Ferrari's principle. 4.2. Explain double revolving field theory and Cross-field theory to analyze starting torque of 1-phase induction motor.
	2 <sup>nd</sup>	Internal Assessment
	3 <sup>rd</sup>	4.2. Explain double revolving field theory and Cross-field theory to analyze starting torque of 1-phase induction motor.
	4 <sup>th</sup>	4.3. Explain Working principle, Torque speed characteristics, performance characteristics and application of following single phase motors. 4.3.1. Split phase motor.



11 <sup>th</sup>	1 <sup>st</sup>	4.3.2. Capacitor Start motor.
		4.3.3. Capacitor start, capacitor run motor.
	2 <sup>nd</sup>	4.3.4. Permanent capacitor type motor.
		4.3.5. Shaded pole motor.
	3 <sup>rd</sup>	4.4. Explain the method to change the direction of rotation of above motors.
	4 <sup>th</sup>	4.4. Explain the method to change the direction of rotation of above motors.
12 <sup>th</sup>	1 <sup>st</sup>	<b>5. COMMUTATOR MOTORS:</b>
		5.1. Construction, working principle, running characteristic and application of single phase series motor.
	2 <sup>nd</sup>	5.1. Construction, working principle, running characteristic and application of single phase series motor.
	3 <sup>rd</sup>	5.2. Construction, working principle and application of Universal motors.
	4 <sup>th</sup>	5.2. Construction, working principle and application of Universal motors.
13 <sup>th</sup>	1 <sup>st</sup>	5.3. Working principle of Repulsion start Motor, Repulsion start Induction run motor, Repulsion Induction motor.
	2 <sup>nd</sup>	5.3. Working principle of Repulsion start Motor, Repulsion start Induction run motor, Repulsion Induction motor.
	3 <sup>rd</sup>	<b>6. SPECIAL ELECTRICAL MACHINE:</b>
		6.1. Principle of Stepper motor.
		6.2. Classification of Stepper motor.
	4 <sup>th</sup>	6.3. Principle of variable reluctance stepper motor.
14 <sup>th</sup>	1 <sup>st</sup>	6.4. Principle of Permanent magnet stepper motor.
	2 <sup>nd</sup>	6.5. Principle of hybrid stepper motor.
	3 <sup>rd</sup>	6.6. Applications of Stepper motor.
	4 <sup>th</sup>	<b>7. THREE PHASE TRANSFORMERS:</b>
		7.1. Explain Grouping of winding, Advantages.
15 <sup>th</sup>	1 <sup>st</sup>	Class Test
	2 <sup>nd</sup>	7.2. Explain parallel operation of the three phase transformers.
	3 <sup>rd</sup>	7.3. Explain tap changer (On/Off load tap changing)
	4 <sup>th</sup>	7.4. Maintenance Schedule of Power Transformers

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Lect. (Electrical)  
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