ACADEMIC LESSON PLAN OF WINTER 2022

Discipline: ELECTRICAL	Semester: 5th Sem	Name of the Teaching Faculty: **SUDIPTA KUMAR DAS**
Subject: ENERGY CONVERSION-II	No. of days/per week class allotted:5p/week	Semester From: 15ST OCTOBER 2022 to 22thDECEMBER2022 No. of weeks:13 weeks
Week	**Class Day**	**Theory Topics**
1st	1ST	**1. ALTERNATOR:** 1.1. Types of alternator and their constructional features.
	2ND	1.2. Basic working principle of alternator and the relation between speed and frequency.
2nd	1ST	.3. Terminology in armature winding and expressions for winding factors (Pitch factor, Distribution factor).
3rd	**1ST**	1.4. Explain harmonics, its causes and impact on winding factor.
	2ND	1.5. E.M.F equation of alternator. (Solve numerical problems).
	3RD	1.5. E.M.F equation of alternator. (Solve numerical problems).
	4TH	1.6. Explain Armature reaction and its effect on emf at different power factor of load.
4th	**1ST**	1.7. The vector diagram of loaded alternator. (Solve numerical problems)
	2ND	1.8. Testing of alternator (Solve numerical problems) 1.8.1. Open circuit test.
	3RD	1.8.2. Short circuit test.
	4TH	1.9. Determination of voltage regulation of Alternator by direct loading and synchronous impedance method. (Solve numerical problems)
	5TH	1.9. Determination of voltage regulation of Alternator by direct loading and Synchronous impedance method. (Solve numerical problems)
	6TH	1.10. Parallel operation of alternator using synchro-scope and dark & Brightlamp method.
5th	**1ST**	1.11. Explain distribution of load by parallel connected alternators.
	2ND	**2. SYNCHRONOUS MOTOR:** 2.1. Constructional feature of Synchronous Motor. 2.2. Principles of operation, concept of load angle
	3RD	2.3. Derive torque, power developed.
	4TH	2.4. Effect of varying load with constant excitation. 2.5. Effect of varying excitation with constant load.
	5TH	2.6. Power angle characteristics of cylindrical rotor motor.
6th	1ST	2.7. Explain effect of excitation on Armature current and power factor.
	2ND	2.8. Hunting in Synchronous Motor. 2.9. Function of Damper Bars in synchronous motor and generator.

	3RD	2.10. Describe method of starting of Synchronous motor.
	4TH	2.11. State application of synchronous motor.
7th	1ST	**3. THREE PHASE INDUCTION MOTOR:** 3.1. Production of rotating magnetic field.
	2ND	3.2. Constructional feature of Squirrel cage and Slip ring induction motors.
	3RD	3.3. Working principles of operation of 3-phase Induction motor.
	4TH	3.4. Define fine slip speed, slip and establish the relation of slip with rotor quantities.
	5TH	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.
	5TH	3.10. Explain speed control by Voltage Control, Rotor resistance control, Pole changing, frequency control methods.
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.
	5TH	**4. SINGLE PHASE INDUCTION MOTOR:** 4.1. Introduction and Explain Ferrari's principle.
	5TH	4.2. Explain double revolving field theory and Cross-field theory to analyze starting torque of 1-phase induction motor.
10th	1ST	4.2. Explain double revolving field theory and Cross-field theory to analyze starting torque of 1-phase induction motor.
	2ND	4.3. Explain Working principle, Torque speed characteristics, performance characteristics and application of following single phase motors. 4.3.1. Split phase motor.
	3RD	4.3.2. Capacitor Start motor. 4.3.3. Capacitor start, capacitor run motor.
	4TH	4.3.4. Permanent capacitor type motor. 4.3.5. Shaded pole motor.

	5TH	4.4. Explain the method to change the direction of rotation of above motors.
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	5TH	**5. COMMUTATOR MOTORS:** 5.1. Construction, working principle, running characteristic and application of single phase series motor.
11th	**1ST**	5.1. Construction, working principle, running characteristic and application of single phase series motor.
	2ND	5.2. Construction, working principle and application of Universal motors.
	3RD	5.2. Construction, working principle and application of Universal motors.
	4TH	5.3. Working principle of Repulsion start Motor, Repulsion start Induction run motor, Repulsion Induction motor.
	5TH	5.3. Working principle of Repulsion start Motor, Repulsion start Induction run motor, Repulsion Induction motor.
12th	**1ST**	**6. SPECIAL ELECTRICAL MACHINE:** 6.1. Principle of Stepper motor. 6.2. Classification of Stepper motor.
	2ND	6.3. Principle of variable reluctant stepper motor.
	3RD	6.4. Principle of Permanent magnet stepper motor.
	4TH	6.5. Principle of hybrid stepper motor.
	5TH	6.6. Applications of Stepper motor.
13th	1ST	**7. THREE PHASE TRANSFORMERS:** 7.1. Explain Grouping of winding, Advantages.
	2ND	7.2. Explain parallel operation of the three phase transformers.
	3RD	7.2. Explain parallel operation of the three phase transformers.
	4TH	7.3. Explain tap changer (On/Off load tap changing)
	5TH	7.4. Maintenance Schedule of Power Transformers