GOVERNMENT POLYTECHNIC KORAPUT

Th2. Energy Conversion-2

Name of the Course: Diploma in Electrical Engineering			
Faculty: Sandhya Kumari Randhi			
Course code:	Th2	**Semester W.E.F 14/09/2022**	3rd
Total Period:	60	**Examination**	3hrs
Theory periods:	4P/week	**Internal Assessment :**	20
Maximum marks:	100	**End Semester Examination:**	80

DEPARTMENT OF ELECTRICAL

Vision:-

To create competent and industry ready Electrical diploma engineers with professional and social values to meet future challenges.

Mission:-

- To prepare diploma holders through "qualitative competency based education system" to compete with national requirement along with core values
- To produce dynamic Electrical Engineers to serve the society and industry .
- To develop leadership qualities, communication skills, critical thinking and attitude for Lifelong learning.

Program educational objectives:-

PEO1:	Apply technical knowledge and skills learned in the field of Electrical Engineering to excel in professional and/or higher education.
PEO2:	to provide students an excellent academic environment and make them aware the needs of Society and Industry to become a successful Professional/Entrepreneur.
PEO3:	To engage in lifelong learning, career enhancement to adopt emerging technologies

Course outcomes:-

CO1	Describe construction and working principle of AC machines and special machines.
CO2	Explain the starting and speed control of AC motors.
CO3	Determine losses and efficiency and develop problem solving ability on synchronous machine and 3 phase induction motor for better understanding about the concept of machine.
CO4	Familiar with different testing methods carried out on 3 phase machines.

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TOPIC WISE DISTRIBUTION OF PERIODS

Sl.No.	Name of the Topic Name of the Topic Period	Period
1	ALTERNATOR	14
2	SYNCHRONOUS MOTOR	08
3	INDUCTION MOTOR	14
4	SINGLE PHASE INDUCTION MOTOR	08
5	COMMUTATOR MOTOR	06
6	SPECIAL ELECTRICAL MACHINE	05
7	3 PHASE TRANSFORMER	05
	TOTAL	60

LESSON PLAN

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.
	3rd	.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	1.5. E.M.F equation of alternator. (Solve numerical problems).
	3rd	1.6. Explain Armature reaction and its effect on emf at different power factor of load.
	4th	1.7. The vector diagram of loaded alternator. (Solve numerical problems)
3rd	1st	1.8. Testing of alternator (Solve numerical problems) 1.8.1. Open circuit test.
	2nd	1.8.2. Short circuit test.
	3rd	1.9. Determination of voltage regulation of Alternator by direct loading and synchronous impedance method. (Solve numerical problems)
	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.
	3rd	**2. SYNCHRONOUS MOTOR:** 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. 2.5. Effect of varying excitation with constant load.
	2nd	2.6. Power angle characteristics of cylindrical rotor motor.
	3rd	2.7. Explain effect of excitation on Armature current and power factor.
	4th	2.8. Hunting in Synchronous Motor. 2.9. Function of Damper Bars in synchronous motor and generator.
6th	1st	2.10. Describe method of starting of Synchronous motor.
	2nd	2.11. State application of synchronous motor.

	3rd	**3. THREE PHASE INDUCTION MOTOR:** 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 fine 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. (solve numerical problems)
	4th	3.6. Torque-slip characteristics.
8th	1st	3.7. Derive relation between full load torque and starting torque etc. (solve numerical problems)
	2nd	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)
	3rd	3.9. Methods of starting and different types of starters used for three phase Induction motor.
	4th	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.
10th	1st	**4. SINGLE PHASE INDUCTION MOTOR:** 4.1. Introduction and 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.
	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.
12th	1st	**5. COMMUTATOR MOTORS:** 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.
	3rd	5.2. Construction, working principle and application of Universal motors.
	4th	5.2. Construction, working principle and application of Universal motors.
13th	1st	5.3. Working principle of Repulsion start Motor, Repulsion start Induction run motor, Repulsion Induction motor.
	2nd	5.3. Working principle of Repulsion start Motor, Repulsion start Induction run motor, Repulsion Induction motor.
	3rd	**6. SPECIAL ELECTRICAL MACHINE:** 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.

GOVERNMENT POLYTECHNIC KORAPUT

	4th	**7. THREE PHASE TRANSFORMERS:** 7.1. Explain Grouping of winding. Advantages.
15th	1st	7.2. Explain parallel operation of the three phase transformers.
	2nd	7.2. Explain parallel operation of the three phase transformers.
	3rd	7.3. Explain tap changer (On/Off load tap changing)
	4th	7.4. Maintenance Schedule of Power Transformers

14/09/2022

Signature of faculty concerned

14/09/2022

H.O.D. Electrical