



GOVERNMENT POLYTECHNIC, PURI

DEPARTMENT OF ELECTRICAL ENGINEERING

Discipline:
**ELECTRICAL
ENGG**

Semester: 5TH

Name of the Teaching Faculty: **MR NIHAR DIKSHIT, PTGF IN ELECTRICAL ENGG.**

Subject: **ENERGY
CONVERSION-II**

No. of classes
allotted per
week : **04**

Semester From date: **01.08.2023** To Date: **30.11.2023**



No. of weeks: 15

PRE- REQUISITE Basic knowledge of Electrical Machine, Phasor Diagram, Engineering Mathematics.

COURSE OUTCOMES

On successful completion, a student will be able to:

1. Understand of various parts, material specifications and construction of 3-phase Synchronous machines,
2. Detailed understanding of various parts of 3-phase & 1-phase A.C Motors, F.H.P and other special machines.
3. Describe the acquired knowledge about operating principle, working characteristics, torque equation, losses and efficiency of all machines involved in the course.
4. Familiar with starting and speed control of A.C Motors.
5. Develop understanding of different testing methods carried out on 3 phase machines.

Week	Class Day	Theory / Practical Topics	DELIVERY METHOD
 1st	1st	ALTERNATOR: Types of alternator and their constructional features.	whiteboard
	2nd	Basic working principle of alternator and the relation between speed and frequency.	PPT
	3rd	Terminology in armature winding and expressions for winding factors (Pitch factor, Distribution factor).	whiteboard
	4th	Explain harmonics, its causes and impact on winding factor.	whiteboard
2nd	1st	E.M.F equation of alternator. (Solve numerical problems).	whiteboard
	2nd	Explain Armature reaction and its effect on emf at different power factor of load.	whiteboard
	3rd	The vector diagram of loaded alternator. (Solve numerical problems)	whiteboard
	4th	Testing of alternator (Solve numerical problems) 1.8.1. Open circuit test. 1.8.2. Short circuit test.	whiteboard
3rd	1st	Determination of voltage regulation of Alternator by direct loading and synchronous impedance method. (Solve numerical problems)	whiteboard
	2nd	Parallel operation of alternator using synchro-scope and dark & bright lamp method.	whiteboard
	3rd	Explain distribution of load by parallel connected alternators.	whiteboard
	4th	SYNCHRONOUS MOTOR: Constructional feature of Synchronous Motor.	whiteboard
4th	1st	Principles of operation, concept of load angle	whiteboard
	2nd	Derive torque, power developed.	whiteboard
	3rd	Effect of varying load with constant excitation	whiteboard
	4th	Effect of varying excitation with constant load.	whiteboard
5th	1st	Power angle characteristics of cylindrical rotor motor	PPT
	2nd	Explain effect of excitation on Armature current and power factor.	PPT
	3rd	Hunting in Synchronous Motor.	whiteboard
	4th	Function of Damper Bars in synchronous motor and generator.	whiteboard
 6th	1st	Describe method of starting of Synchronous motor.	whiteboard
	2nd	State application of synchronous motor.	whiteboard
	3rd	THREE PHASE INDUCTION MOTOR: Production of rotating magnetic field.	PPT
	4th	Constructional feature of Squirrel cage and Slip ring induction motors.	whiteboard
7th	1st	Working principles of operation of 3-phase Induction motor.	whiteboard
	2nd	Define slip speed, slip and establish the relation of slip with rotor quantities.	whiteboard
	3rd	Derive expression for torque during starting and running conditions and derive conditions for maximum torque. (solve numerical problems)	whiteboard
	4th	Torque-slip characteristics.	whiteboard
8th	1st	Derive relation between full load torque and starting torque etc. (solve numerical problems)	PPT
	2nd	Establish the relations between Rotor Copper loss, Rotor output and Gross Torque and relationship of slip with rotor copper loss. (solve numerical problems)	whiteboard
	3rd	Methods of starting and different types of starters used for three phase Induction motor.	PPT
	4th	Explain speed control by Voltage Control, Rotor resistance control, Pole changing, frequency control methods	whiteboard
9th	1st	Plugging as applicable to three phase induction motor.	whiteboard
	2nd	Describe different types of motor enclosures.	whiteboard
	3rd	Explain principle of Induction Generator and state its applications.	whiteboard
	4th	SINGLE PHASE INDUCTION MOTOR: Explain Ferrari's principle.	whiteboard
10th	1st	Explain double revolving field theory and Cross-field theory to analyze starting torque of 1-phase induction motor.	whiteboard
	2nd	Explain Working principle, Torque speed characteristics, performance characteristics and application of following single phase motors.	whiteboard
	3rd	Split phase motor.	whiteboard

11th	4th	Capacitor Start motor	whiteboard
	1st	Capacitor start, capacitor run motor.	whiteboard
	2nd	Permanent capacitor type motor.	whiteboard
	3rd	Shaded pole motor.	whiteboard
	4th	Explain the method to change the direction of rotation of above motors.	whiteboard
12th	1st	COMMUTATOR MOTORS: Construction, working principle, running characteristic and application of single phase series motor.	PPT
	2nd	Construction, working principle and application of Universal motors.	PPT
	3rd	Working principle of Repulsion start Motor, Repulsion start Induction run motor, Repulsion Induction motor.	PPT
	4th	SPECIAL ELECTRICAL MACHINE: Principle of Stepper motor.	whiteboard
13th	1st	Classification of Stepper motor.	whiteboard
	2nd	Principle of variable reluctance stepper motor	whiteboard
	3rd	Principle of Permanent magnet stepper motor.	PPT
	4th	Principle of hybrid stepper motor.	PPT
14th	1st	Applications of Stepper motor.	whiteboard
	2nd	THREE PHASE TRANSFORMERS: Explain Grouping of winding, Advantages.	whiteboard
	3rd	Explain parallel operation of the three phase transformers.	whiteboard
	4th	Explain tap changer (On/Off load tap changing)	whiteboard
15th	1st	Maintenance Schedule of Power Transformers.	whiteboard
	2nd	Revision & Previous Year Question Discussion	whiteboard
	3rd	Revision & Previous Year Question Discussion	whiteboard
	4th	Revision & Previous Year Question Discussion	whiteboard

LEARNING RESOURCES:

1. Electrical Technology – I.I.B. L. Thareja and A. K. Thareja, S. Chand
2. Textbook of Electrical Machines, K. R. Siddhapura, D. B. Raval Vikas
3. Electrical Technology, J. B. Gupta, S. K. Kataria and Sons
4. Electric Machine, Ashfaq Husain, Dhanpat Rai and Sons

WEBSITE RESOURCES:

1. <https://youtube.com/playlist?list=PLbRMhDVUMngcDrGXlt-hX-ekpldUIC2b6>
2. https://youtube.com/playlist?list=PLs5_Rt2P2r5YY5b23uDGtrpo42ezMmGp

01.08.23
Sign. of Faculty concerned

Principal
G.P Puri

2. P. C. Choudhary
11/8/23
Sign. of HOD