Program : **Diploma in Electrical and Electronics Engineering**	
Course Code : **5037**	Course Title: **Synchronous Machines Lab**
Semester : **5**	Credits: **1.5**
Course Category: **Program Core**	
Periods per week: **3 (L:0 T:0 P:3)**	Periods per semester: **45**

Course Objectives:

- To identify the parts, nameplate data and connection terminals of synchronous generator.
- To develop performance characteristics of synchronous generator.
- To synchronize synchronous generator to the utility grid.
- To identify the parts, nameplate data and connection terminals of synchronous motor.
- To develop performance characteristics of synchronous motor.

Course Prerequisites:

Topic	Course code	Course name	Semester
Knowledge of measurements		Electrical & Electronics Measurements & Instrumentation	3
Knowledge of measurements		Electrical and Electronics Measurements Lab	3
Knowledge in machines		DC Machines & Traction Motors	3
Knowledge in machines		DC Machines Lab	3
Knowledge in machines		Induction Machines	4
Knowledge in machines		Induction machines lab	4
Knowledge in machines		Synchronous Machines	5

Course Outcomes:

On completion of the course, the students will be able to:

COn	Description	Duration (Hours)	Cognitive level
CO1	Identify the parts, nameplate data of synchronous generators.	6	Applying

CO2	Develop the performance characteristics of synchronous generators	15	Applying
CO3	Apply various methods to synchronize three phase alternators to busbar	9	Understanding
CO4	Develop performance characteristics of synchronous motor	9	Applying
	Lab Exam	6	

CO-PO Mapping:

Course Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1				2			
CO2				3			
CO3		3					
CO4				3			

3-Strongly mapped, 2-Moderately mapped, 1-Weakly mapped

Course Outline:

Module Outcome	Description	Duration (Hours)	Cognitive level
CO1	**Identify the parts, nameplate data of synchronous generator.**		
M1.01	i. Identify and collect the name plate details of synchronous generator. ii. Identify the parts of synchronous generator.	3	Applying
M1.02	Apply constant field current to run an alternator at different speeds and observe the frequency and voltage.	3	Understanding
CO2	**Develop the performance characteristics of synchronous generator.**		
M2.01	Develop a circuit and run a synchronous generators at rated speed and plot the open circuit characteristics	3	Applying
M2.02	Apply load on alternator and determine regulation at various power factor	3	Applying
M2.03	Develop a circuit for pre-determine regulation of three phase synchronous generator at various power factor by EMF method	3	Applying

M2.04	Construct a circuit for pre-determine regulation of three phase synchronous generator at various power factor by MMF method	3	Applying
M2.05	Identify and implement the procedural steps of ZPF method.	3	Applying
	Series test - I	3	
CO3	**Apply various methods to synchronize three phase alternators to busbar.**		
M3.01	Develop a circuit to setup the synchronization of alternators or Synchronize alternator to bus bars using various methods.	9	Applying
CO4	Develop performance characteristics of synchronous motor		
M4.01	i. Identify and Collect nameplate data of synchronous motor ii. Identify the parts of synchronous motor	3	Applying
M4.02	Develop a circuit for plotting 'V' and' inverted V' curves of a synchronous motor at various load conditions.	6	Applying
	Series test - II	3	

Text / Reference:

T/R	Book Title/Author
T1	BL Theraja. Electrical technology. Vol- II: S Chand & co.
R1	JB Gupta. Theory and performance of electrical Machines: S. K. Kataria & Sons
R2	SK Sahdev. Electrical Machines. Cambridge university press

Online Resources:

Sl.No	Website Link
1	https://www.iare.ac.in/sites/default/files/lab1/IARE_AC_MACHINES_LAB_MANUAL.pdf
2	http://www.eee.griet.ac.in/document/labmanuals/II-II%20EM-II%20Lab%20Manual.pdf
3	https://ggn.dronacharya.info/EEEDept/Downloads/Labmanuals/5th_Semester/EM_II_Manual_(new).pdf
4	http://www.crectirupati.com/sites/default/files/lab1/EM2%20LAB%203-1.pdf
5	http://www.anuraghyd.ac.in/eee/wp-content/uploads/sites/3/EM-II.pdf
6	https://www.bitswgl.ac.in/ece/B.Tech%20Lab%20manuals/AC%20Electrical%20Machines%20Lab%20Manual%203%20-1.pdf

Student Activity

Suggested Open-ended Experiments:

Students can do open ended experiments as a group of 3-5. There is no duplication in experiments in between groups. This is mainly for the purpose of continuous internal evaluation and a score of 15 marks. Students should prepare a separate report on open ended experiment of their choice.