COURSE CONTENT

ELECTRICAL MACHINES-II LAB								
II Semester: EEE								
Course Code	**Category**	**Hours/Week**			**Credits**	**Maximum Marks**		
		L	**T**	**P**	**C**	**CIA**	**SEE**	**Total**
2540280	**Core**	0	0	2	1	40	60	100
Contact Classes: Nil	**Tutorial Classes: Nil**	**Practical Classes: 30**				**Total Classes:30**		
Prerequisites: **Electrical Machines – I**								

Course Overview:

This laboratory course provides hands-on experience in testing and performance analysis of transformers, induction motors, and synchronous machines. It covers efficiency determination, regulation, equivalent circuit parameters, and characteristic curves using standard testing methods, preparing students for practical applications in electrical machines.

Course Objectives:

1. To understand and identify the procedures for performing standard tests on transformers and induction motors.
2. To understand and explain the concepts of equivalent circuits, phasor diagrams, and machine characteristics.
3. To develop the ability to apply testing methods for determining parameters like Xd, Xq, and V-curves in synchronous machines.
4. To develop skills to analyze the performance, efficiency, and torque characteristics of three-phase induction motors and transformers.
5. To acquire the ability to evaluate the regulation and performance of three-phase alternators using various experimental methods.

Course Outcomes: After Completion of the Course, Students should be able to

1. Identify the procedures for performing Sumpner's test, no-load & blocked rotor tests, and brake test on transformers and induction motors.
2. Explain the concepts of equivalent circuits and phasor relationships in single-phase and three-phase machines.
3. Apply the methods for determining Xd and Xq, and performing V and inverted V curve tests on synchronous motors.
4. Analyze the performance and efficiency of three-phase induction motors and transformers using test data.
5. Evaluate the regulation of three-phase alternators using synchronous impedance, MMF, ZPF, and ASA methods.

The following experiments are required to be conducted as compulsory experiments:

1. Sumpner's test on a pair of single-phase transformers
2. No-load & Blocked rotor tests on three phase Induction motor
3. Regulation of a three –phase alternator by synchronous impedance & MMF methods
4. 'V' and 'Inverted V' curves of a three—phase synchronous motor.
5. Equivalent Circuit of a single-phase induction motor
6. Determination of Xd and Xq of a salient pole synchronous machine
7. Brake Test on three phase Induction Motor
8. Efficiency of a three-phase alternator

In addition to the above experiments, at least any two of the following experiments are required to be conducted from the following list:

1. Separation of core losses of a single-phase transformer
2. Parallel operation of Single-phase Transformers
3. Measurement of sequence impedance of a three-phase alternator.
4. Regulation of three-phase alternator by ZPF and ASA methods

Proposed open ended experiment:

1. Verification of torque-speed behavior of an electric motor under varying load conditions using digital simulation.

TEXT BOOKS:

1. P. S. Bimbhra, “Electrical Machinery”, Khanna Publishers, 2011.
2. I.J. Nagrath and D. P. Kothari, “Electric Machines”, McGraw Hill Education, 2010.

REFERENCE BOOKS:

1. Prithwiraj Purkait, Indrayudh Bandyopadhyay, “Electrical Machines”, Oxford, 2017.
2. M. G. Say, “Performance and design of AC machines”, CBS Publishers, 2002.
3. A. E. Fitzgerald and C. Kingsley, "Electric Machinery”, New York, McGraw Hill Education, 2013.
4. A. E. Clayton and N. N. Hancock, “Performance and design of DC machines”, CBS Publishers, 2004.

ELECTRONIC RESOURCES:

1. **https://nptel.ac.in/**
2. **https://electrical-engineering-portal.com/**
3. **https://www.allaboutcircuits.com/**
4. **https://ocw.mit.edu/**
5. **https://www.mathworks.com/help**

MATERIALS ONLINE:

1. Lab Manual
1. Open-ended experiments