AC MACHINES LABORATORY

IV Semester: EEE

Course Code	Category	Hours / Week			Credits	Maximum Marks		
		L	T	P	C	CIA	SEE	Total
AEEC13	Core	0	0	3	1.5	30	70	100
Contact Classes: Nil	Tutorial Classes: Nil	Practical Classes: 36				Total Classes:36		

Prerequisite: Electrical Circuits Linear Algebra and Calculus

I. COURSE OVERVIEW:

This is the main lab where experiments like load test on various machines, speed control tests, open circuit tests, short circuit tests, etc are carried out. And also wide variety of practical experiments are performed here with combination of different rotating machines. The laboratory is also used for research activities in machines and to carry out project works on energy conversion.

II. COURSE OBJECTIVES:

The students will try to learn:

I. Evaluate losses and determine the efficiency of single phase and three phase electrical machines.
II. Determine the voltage regulation, efficiency and temperature rise in various transformers.
III. Apply PLC and digital simulation software to gain practical knowledge.

III. COURSE SYLLABUS:

Week – 1: OC AND SC TEST ON SINGLE PHASE TRANSFORMER
Determine the equivalent circuit parameters; predetermine the efficiency and regulation by open circuit and short circuit test on a single phase transformer

Week – 2: SUMPNER'S TEST
Predetermine the efficiency and regulation of two identical single phase transformers

Week – 3: LOAD TEST ON SINGLE PHASE TRANSFORMERS
Determination of efficiency by load test on a single phase transformer

Week – 4: SCOTT CONNECTION OF TRANSFORMERS
Conversion of three phase to two phase using single phase transformers

Week – 5: SEPARATION OF CORE LOSSES IN SINGLE PHASE TRANSFORMER
Find out the eddy current and hysteresis losses in single phase transformer

Week – 6: HEAT RUN TEST ON SINGLE PHASE TRANSFORMERS
Determine the temperature rise in three single phase transformers set

Week – 7: BRAKE TEST ON THREE PHASE SQUIRREL CAGE INDUCTION MOTOR
Plot the performance characteristics of three phase induction motor

Week – 8: CIRCLE DIAGRAM OF THREE PHASE SQUIRREL CAGE INDUCTION MOTOR
Plot the circle diagram and predetermine the efficiency and losses of three phase squirrel cage induction motor

Week – 9: REGULATION OF ALTERNATOR BY EMF METHOD
Determine the regulation of alternator using synchronous impedance method

Week – 10: REGULATION OF ALTERNATOR BY MMF METHOD
Determine the regulation of alternator using amperes turns method

Week – 11: SLIP TEST ON THREE PHASE SALIENT POLE SYNCHRONOUS MOTOR

Determination of Xd and Xq in a three phase salient pole synchronous motor.

Week – 12: V' AND INVERTED 'V' CURVES OF SYNCHRONOUS MOTOR

Plot 'V' and inverted 'V' curves to study the effect of power factor in synchronous motor.

Week – 13: EQUIVALENT CIRCUIT PARAMETERS OF SINGLE PHASE INDUCTION MOTOR

Determine the equivalent circuit parameters of a single phase induction motor

Week – 14: STARTING AND SPEED CONTROL OF INDUCTION MOTOR USING PLC

Implementation of star-delta starter using PLC; Speed control of three phase slip ring induction motor with rotor resistance cutting using PLC

IV. REFERENCE BOOKS:

1. P S Bimbhra, "Electrical Machines", Khanna Publishers, 2nd Edition, 2008.
2. M G Say, E O Taylor, "Direct Current Machines", Longman Higher Education, 1st Edition, 1985.
3. Hughes, "Electrical Technology", Prentice Hall, 10th Edition, 2015.
4. Nesimi Ertugrul, "LabVIEW for Electric Circuits, Machines, Drives, and Laboratories", Prentice Hall, 1st Edition, 2002.
5. Gupta, Gupta & John, "Virtual Instrumentation Using LabVIEW", Tata McGraw-Hill, 1st Edition, 2005.

V. WEB REFERENCES:

1. https://www.ee.iitkgp.ac.in
2. https://www.citchennai.edu.in
3. https://www.iare.ac.in /