CODE	COURSE NAME	CATEGORY	L	T	P	CREDIT
EEL333	ELECTRICAL MACHINES LAB II	PCC	0	0	3	2

Preamble: The purpose of this lab is to provide practical experience in the operation and testing of synchronous and induction machines.

Prerequisite : Fundamentals of Electrical Engineering

Course Outcomes: After the completion of the course the student will be able to:

CO 1	Analyse the performance of single phase and three phase induction motors by conducting suitable tests.
CO 2	Analyse the performance of three phase synchronous machine from V and inverted V curves.
CO 3	Analyse the performance of a three phase alternator by conducting suitable tests.

Mapping of course outcomes with program outcomes

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO 1	3	3	2	2	-	-	-	-	3	2	-	3
CO 2	3	3	2	2	-	-	-	-	3	2	-	3
CO 3	3	3	2	2	-	-	-	-	3	2	-	3

Assessment Pattern

Marks distribution

Total Marks	CIE	ESE	ESE Duration
150	75	75	3 hours

Continuous Internal Evaluation Pattern:

Attendance:	15 marks
Continuous Assessment:	30 marks
Internal Test (Immediately before the second series test) :	30 marks

End Semester Examination Pattern: The following guidelines should be followed regarding award of marks

(a) Preliminary work	15 Marks
(b) Implementing the work/Conducting the experiment	10 Marks
(c) Performance, result and inference (usage of equipment and trouble-shooting)	25 Marks
(d) Viva voce	20 marks
(e) Record	5 Marks

General instructions: Practical examination to be conducted immediately after the second series test covering entire syllabus given below. Evaluation is a serious process that is to be conducted under the equal responsibility of both the internal and external examiners. The number of candidates evaluated per day should not exceed 20. Students shall be allowed for the University examination only on submitting the duly certified Laboratory Record. The external examiner shall endorse the record.

LIST OF EXPERIMENTS

(A minimum of **TWELVE** experiments are mandatory out of the fifteen listed.)

1. Load test on a three phase Slip Ring Induction Motor

Objectives:

a) Start the motor using auto transformer or rotor resistance starter
b) Plot the performance characteristics

2. No load and block rotor tests on a three phase Squirrel Cage Induction Motor

Objectives:

a) Predetermination of performance parameters from circle diagram
b) Determination of equivalent circuit

3. Starting of a three phase Squirrel Cage Induction Motor using Y-Δ Starter

Objectives:

a) Start the motor using Y-Δ Starter and perform load test
b) Plot the performance characteristics

4. Performance characteristics of a Pole Changing Induction Motor

Objectives:

a) Run the motor in two different pole configurations (example 4 pole and 8 pole)
b) Analyse the performance in the two cases by constructing circle diagrams and compare the results

5. No Load and Blocked Rotor Tests on a single phaseInduction Motor

Objectives:

a) Conduct no load and blocked rotor tests on the motor
b) Predetermine the equivalent circuit

6. Load Test on a single phaseInduction Motor

Objectives:

a) Perform load test on the motor

b) Plot the performance characteristics of the motor

7. Variation of starting torque with rotor resistance in Slip-Ring Induction Motors

Objectives:

a) Plot the variation of starting torque against rotor resistance in a three phase slip ring induction motor
b) Find the external rotor resistance for which maximum starting torque is obtained.

8. V and inverted V curves of a Synchronous Motor

Objectives:

Plot the V and inverted V curves of the Synchronous Motor at no load and full load.

9. Regulation of a three phase Alternator by direct loading

Objectives:

a) Determine the regulation of three phase alternator
b) Plot the regulation versus load curve

10. Regulation of a three phase Alternator by emf and mmf methods

Objectives:

Predetermine the regulation of alternator by emf and mmf methods at 0.8pf lag, upf and 0.8pf lead.

11. Regulation of a three phase alternator by Potier method

Objectives:

a) Synchronize the alternator by dark lamp method
b) Plot ZPF characteristics and determine armature reactance mmf and potier reactance
c) Predetermine the regulation by ZPF method

12. Reactive power control in grid connected Alternators

Objectives:

a) Synchronize the alternator by bright lamp method
b) Control the reactive power and plot the V and inverted V curves for generator operation

13. Slip Test on a three phase Salient Pole Alternator

Objectives:

a) Determine the direct and quadrature axis synchronous reactances
b) Predetermine the regulation at 0.8 lagging power factor

14. V/f control of three phase Squirrel Cage Induction Motor

Objectives:

Perform speed control of the given three phase induction motor by V/f control

15. Performance characteristics of a three phase Induction Generator

Objectives:

Plot the performance characteristics of the generator.

Reference Books

1) Bimbra P S, *Electric Machines*, Khanna Publishers, 2nd edition, 2017.

2). KothariD. P., NagrathI. J., *Electric Machines*, Tata McGraw Hill, 5th edition, 2017.

3) Say M.G, *The Performance and Design of AC Machines*, CBS Publishers, New Delhi, 3rd edition, 2002.

4) Alexander SLangsdorf, "Theory of Alternating Current Machinery", Tata McGraw Hill, 2nd revised edition, 2001.