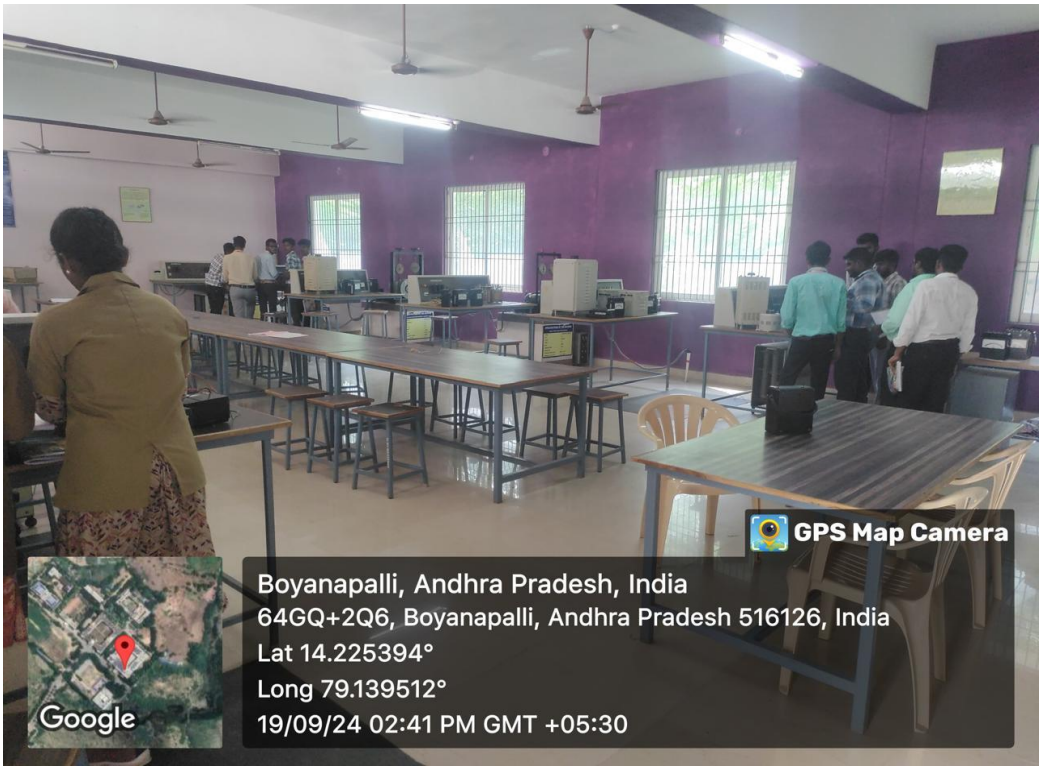
ANNAMACHARYA UNIVERSITY: RAJAMPET

EEE DEPARTMENT

AC MACHINES LAB



1. **Lab photo**



2. **Description of AC Machines Lab**

The **AC Machines Laboratory** provides hands-on experience in understanding the characteristics, performance, and operational aspects of various alternating current (AC) electrical machines. This laboratory is designed to complement theoretical knowledge with experimental verification, enabling students to analyze the behavior of AC machines under different loading and operating conditions.

In this lab, students conduct experiments on **single-phase and three-phase induction motors, synchronous machines, alternators, and special machines**. They learn to determine performance parameters such as efficiency, power factor, regulation, slip, torque, and load characteristics. The laboratory also helps students develop skills in starting methods, testing procedures, speed control techniques, synchronization of alternators, and parallel operation of AC generators.

The AC Machines Lab is well-equipped with **transformers, induction motors, synchronous motors, alternators, starters, measuring instruments, and loading arrangements** to carry out experiments safely and effectively. By working in this laboratory, students gain practical insights into the functioning of AC machines, preparing them for applications in **power systems, industries, renewable energy systems, and electrical drives**.

3. Total Cost of the lab Rs.16,07,453/-

4. **Cost and quantity Information about the Equipment present in AC Machines Lab**

S.No.	Item Description	Value (in Rs.)	Quantity
1.	AC distribution panel board	30,000	1
2.	DC shunt motor – Alternator set	67,600	1
		1,25,000	1
		1,25,000	1
		1,31,250	1
		70,850	1
3.	Three Phase Slip Ring Induction Motor	47,700	1
4.	Three Phase Squirrel Cage Induction Motor	27,500	1
5.	Three Phase Synchronous Motor	90,500	1
6.	Single Phase Induction Motor	10,800	1
7.	Single Phase Transformers(two winding)	10,800	7
8.	Scott Connected Transformers	9000	2
9.	Rheostats	25,400	12
10.	230V, 5KW Loading Rheostats	18,300	2
		16,000	2
11.	DC Voltmeters	2,899	2
12.	AC Voltmeters	21,743	18
		2898	1
13.	DC Ammeters	2899	2

		1449	2
14.	AC Ammeters	26091	17
		1449	1
15.	Single Phase LPF wattmeters	17280	2
16.	Single Phase UPF wattmeters	13680	2
17.	Two Element wattmeter	31500	4
		8500	1
18.	Digital Tachometers	12000	4
		3000	1
19.	Panel Boards (With working tables)	77000	12
20.	3 Phase Auto Transformer	57,600	1
21.	1 ph Auto Transformer	54,000	1
22.	Two element watt meter	8500	1
23.	Three Phase Synchronous Motor	30,240	1
24.	3 Phase Auto Transformer	28,800	1
25.	3 Phase Auto Transformer	11,300	1
26.	3 Phase Auto Transformer	22,200	1
27.	Two Element Wattmeter	7,960	1
28.	Scott Connected Transformers	26,775	2
29.	Single Phase Transformers(two winding)	5,830	1
30.	Three Phase Squirrel Cage Induction Motor with V/F Drive	1,12,500	1
31.	Single Phase Induction Motor with Capacitor bank	85,635	1
32.	Single Phase AC Series Motor	69,975	1

33.	Three Phase Inductive Load	58,050	1

5. List of experiments as per syllabus

1. Performance of 3-Ph induction motor using No-load & blocked rotor tests.
2. Calculation Regulation of a three-phase alternator by E.M.F. and M.M.F. methods.
3. V and inverted V curves of a three-phase synchronous motor.
4. Determination of X_d and Xq of a salient pole synchronous machine.
5. Equivalent circuit of a single-phase induction motor.
6. Determination of the performance of a 3-phase Induction motor using the Brake test.
7. Determination of performance of Single-Phase Induction motor using Brake test.
8. Measurement of sequence impedance of a three-phase alternator.
9. Speed control of a three-phase induction motor by the V/F method.
10. Power factor improvement of a single-phase induction motor by using capacitors.
11. Regulation of the three-phase alternator by the Potier triangle method.
12. Determination of the efficiency of a single-phase AC series Motor by conducting a Brake test.

6. List of experiments beyond syllabus

13. Parallel operation of three-phase alternator under no-load and load conditions.
14. Determination of efficiency of three phase alternator by loading with three phase induction motor

7. Out of Box experiments

15. Performance Analysis of an Induction Motor with Variable Frequency Drive (VFD)
16. Fault Analysis of a Three-Phase Alternator

8. Scope of Research carried through the lab

- Voltage **Regulation Techniques:** Comparative study of classical methods (EMF, MMF, Potier) with modern computational/AI-based methods.

- Stability **& Dynamic Performance:** Investigation of V and inverted V curves, load angle stability, and synchronization methods relevant to grid-connected systems.

- Renewable **Integration:** Role of synchronous generators in hybrid power systems (wind + grid), alternator behavior under variable mechanical inputs.

- Performance **Enhancement:** Power factor improvement using adaptive capacitor switching.

- Home/**Industrial Applications:** Study of efficiency, load behavior, and noise reduction in single-phase motors used in domestic appliances.

- **IoT-based Monitoring:** Real-time monitoring and control of single-phase induction motors using sensors and microcontrollers.