

A PRACTICAL FILE ON

Basic Electrical Engineering Practical File

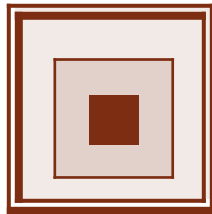
B.Tech · Laboratory record

Submitted in partial fulfilment of the practical examination requirements

BACHELOR OF TECHNOLOGY

in

B.Tech II Sem, EE Lab Batch 3



SUBMITTED BY

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Reg. No. 25EE0311

PROGRAMME

B.Tech II Sem, EE Lab Batch 3

Department of Electrical Engineering

YOUR COLLEGE OF ENGINEERING, COIMBATORE

Session 2025–26

CERTIFICATE

This is to certify that Priya Raghavan, a student of B.Tech II Sem, EE Lab Batch 3, has satisfactorily completed the practical work in Basic Electrical Engineering prescribed by the Department of Electrical Engineering during the academic session 2025–26.

The experiments recorded in this file were performed by the student in the laboratory under my supervision, and the observations and results are the student's own.

Prof. K. Subramanian
Subject Teacher

External Examiner
Date: _____

Dr. L. Narayanan
Head of Department

Acknowledgement

I would like to express my sincere gratitude to my subject teacher, Prof. K. Subramanian, for guidance and encouragement throughout the practical sessions, and for patiently clearing my doubts in the laboratory.

I am also thankful to Dr. L. Narayanan, Head of Department, for providing a well-equipped laboratory, and to the laboratory staff for their help in arranging the apparatus for every experiment.

Finally, I thank my parents and classmates for their constant support while I completed this practical file.

Priya Raghavan

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Write the page number of each experiment in the remarks column once the file is complete.

Laboratory Safety Rules

- Check connections before switching on the supply
- Never touch live terminals
- Use the correct range on meters
- Switch off the supply before changing connections
- Keep the work bench dry and tidy

Experiment 1: Verification of KCL and KVL

Date: 14 Jan 2026

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Aim

To verify Kirchhoff's current law and voltage law for a given DC circuit.

Apparatus / Materials Required

- Regulated DC power supply (0–30 V)
- Resistors (1 k Ω , 2.2 k Ω , 3.3 k Ω)
- Digital multimeters, breadboard and wires

Theory

Kirchhoff's current law states that the algebraic sum of currents meeting at a node is zero. Kirchhoff's voltage law states that the algebraic sum of all voltages around a closed loop is zero.

$$\Sigma I = 0 \text{ at a node}$$

$$\Sigma V = 0 \text{ around a loop}$$

Procedure

1. Connect the circuit on the breadboard as per the diagram.
2. Set the supply to 10 V.
3. Measure the current in each branch at the node.
4. Measure the voltage across each element of the loop.
5. Repeat for 12 V and 15 V and verify both laws.

Observations

Supply (V)	I ₁ (mA)	I ₂ (mA)	I ₃ (mA)	I ₂ + I ₃ (mA)
10	3.12	1.87	1.25	3.12
12	3.75	2.25	1.50	3.75
15	4.68	2.81	1.87	4.68

Observation table (sample readings — replace with your own)

Result

Result

The sum of currents entering the node equals the sum leaving, and the loop voltages add up to zero; KCL and KVL are verified (sample result).

Precautions

- Do not exceed the power rating of the resistors.
- Use the correct meter ranges.

Experiment 2: Thevenin's theorem

Date: 21 Jan 2026**Page No.:** _____**Teacher's sign:** _____

Aim

To verify Thevenin's theorem for a given linear circuit.

Apparatus / Materials Required

- DC supply, resistors and decade resistance box
- Multimeters, breadboard and wires

Theory

Any linear two-terminal network can be replaced by an equivalent circuit consisting of a voltage source V_{th} in series with a resistance R_{th} . The load current is the same in both circuits.

$$I_L = V_{th} / (R_{th} + R_L)$$

Procedure

6. Measure the load current I_L in the original circuit.
7. Remove the load and measure the open-circuit voltage V_{th} .
8. Replace the source with its internal resistance and measure R_{th} .
9. Build the Thevenin equivalent and measure the load current again.

Observations

Quantity	Theoretical	Measured
V_{th} (V)	6.00	5.96
R_{th} (k Ω)	1.65	1.66
I_L original (mA)	2.26	2.24
I_L equivalent (mA)	2.26	2.23

Observation table (sample readings — replace with your own)

Result

Result

The load current in the equivalent circuit matches the original circuit within experimental error; Thevenin's theorem is verified (sample result).

Precautions

- Switch off the supply while changing connections.

Experiment 3: Series RLC resonance

Date: 28 Jan 2026

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Teacher's sign: _____

Aim

To study the frequency response of a series RLC circuit and find its resonant frequency and Q-factor.

Apparatus / Materials Required

- Function generator
- Resistor (100 Ω), inductor (10 mH), capacitor (0.1 μ F)
- AC milliammeter / CRO, breadboard

Theory

In a series RLC circuit, current is maximum at the resonant frequency where inductive and capacitive reactances are equal. The sharpness of resonance is measured by the quality factor.

$$f_0 = 1 / (2\pi \sqrt{LC})$$

$$Q = f_0 / (f_2 - f_1)$$

Procedure

10. Connect R, L and C in series with the function generator.
11. Keep the input voltage constant and vary the frequency from 1 kHz to 10 kHz.
12. Note the current at each frequency.
13. Plot current against frequency and find f_0 , f_1 and f_2 .

Observations

f (kHz)	I (mA)
2	6.1
4	18.4
5	42.0
5.03	43.5
6	24.8
8	10.2

Observation table (sample readings — replace with your own)

Result

Result

Resonant frequency ≈ 5.0 kHz; Q-factor ≈ 3.2 (sample result).

Precautions

- Keep input amplitude constant at every frequency.

Experiment 4: Open-circuit and short-circuit tests on a transformer

Date: 04 Feb 2026

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Aim

To perform open-circuit and short-circuit tests on a single-phase transformer and determine its efficiency and regulation.

Apparatus / Materials Required

- 1 kVA, 230/115 V single-phase transformer
- Autotransformer, wattmeters (LPF and UPF)
- Ammeters and voltmeters

Theory

The open-circuit test gives the core (iron) losses, and the short-circuit test gives the full-load copper losses. These are used to predict efficiency and regulation without loading the transformer.

$$\eta = \text{output} / (\text{output} + P_i + x^2 P_{cu}) \times 100$$

Procedure

14. For the OC test, apply rated voltage to the LV side with the HV side open; note V, I and W.
15. For the SC test, short the LV side and apply reduced voltage to the HV side until rated current flows; note V, I and W.
16. Calculate the equivalent circuit parameters, efficiency and regulation.

Observations

Test	V (V)	I (A)	W (W)
Open circuit	115	0.42	18
Short circuit	12.5	4.35	42

Observation table (sample readings — replace with your own)

Result

Result

Iron loss = 18 W, full-load copper loss = 42 W; full-load efficiency at unity power factor $\approx$ 94.3% (sample result).

Precautions

- Use an autotransformer starting from zero.
- Use an LPF wattmeter for the OC test.

Bibliography

- Laboratory manual issued by the department / school.
- Prescribed textbook for the subject (latest edition).
- Class notes and practical demonstrations by the subject teacher.