



Fourth Class Lab.

**Power & Machine
Electronics & Communications**

Introduction:

The Renewable Energy Laboratory is considered one of the modern laboratories that most international and local universities aspire to establish due to its importance at the scientific and research level. This laboratory was established through the efforts of a staff of members of the Department of Electrical Engineering. Practical and computer experiments (Simulation and modeling) are given at a rate of 2-4 experiments for the total weekly experiments for students. About 16 experiments were prepared, most of which were conducted practically in the laboratory. Benefiting from this laboratory include students in the finishing grades (fourth stage).

In addition to postgraduate students (Master's and PhD), as well as all Lecturers staff who wish to conduct scientific research in this direction.



Table of Experiments

NO.	Name of the Experiment
Experiment 1	Open-Circuit Voltage and Short-Circuit Current of Solar Cells A- Experiment: Study (I-V) characteristic of solar photovoltaic (PV) B- Simulation Study How to measure the open-circuit voltage and short-circuit current of solar cells.
Experiment 2	Effect of irradiation and temperature on the PV Panel Output Power Generation A- Experiment: How do temperature and irradiation affect these values of solar cells. B-Simulation study : Effect of Temperature Variation on Photovoltaic Array and Effect of irradiation on a photovoltaic array
Experiment 3	Series and Parallel Connection of Solar Cells A- Experiment: How to record voltage and current characteristics of a single solar cell, how to record voltage and current characteristics of solar cells in series and in parallel. B- Simulation study :How to record voltage and current characteristics of a single solar cell, how to record voltage and current characteristics of solar cells in series and in parallel.
Experiment 4	Effect of Incidence and Tilt Angles on PV Panel Power Generation and How the Shadowing Effect Experiment : Effect of Incidence and Tilt Angles on PV Panel Power Generation and how the shadowing effect
Experiment 5	Boost Converter A- Experiment: Operation of boost converters, circuit schematics, how to choose the inductor and capacitor values, how to control the output voltage using duty cycle, how to determine the current ripple. B- Simulation study: Operation of boost converters, circuit schematics, how to choose the inductor and capacitor values, how to control

Table of Experiments

NO.	Name of the Experiment
Experiment 6	<p>Buck Converter</p> <p>A- Experiment: Operation of buck converters, circuit schematics, how to choose the inductor and capacitor values, how to control the output voltage using duty cycle, how to determine the current ripple.</p> <p>B- Simulation study: Operation of buck converters, circuit schematics, how to choose the inductor and capacitor values, how to control the output voltage using duty cycle, how to determine the current ripple.</p>
Experiment 7	<p>Maximum Power Point Tracking (MPPT) for Photovoltaic Systems</p> <p>A- Experiment: Control algorithms for maximum power point tracking, how to design a controller for MPPT, operation of MPPT control.</p> <p>B- Simulation study: Control algorithms for maximum power point tracking, how to design a controller for MPPT, operation of MPPT control.</p>
Experiment 8	<p>Performance assessment of Grid connected and Standalone 1kWp Solar Power System</p> <p>A-Experiment on Performance assessment of Grid connected and Standalone 1kWp Solar Power System.</p> <p>B-Simulation study: on Performance assessment of Grid connected and Standalone 1kWp Solar Power System.</p>
Experiment 9	<p>Shadowing effect & diode-based solution in 1kWp Solar PV system</p> <p>A-Experiment on Shadowing effect & diode based solution in 1kWp Solar PV system”.</p> <p>B-Simulation study: on “Shadowing effect & diode based solution in 1kWp Solar PV system”.</p>
Experiment 10	<p>Synchronous 3kw inverter connection with grid</p> <p>Experiment : Synchronous 3kw inverter connection with grid</p>

Table of Experiments

NO.	Name of the Experiment
Experiment 11	Effect of Wind Speed on Wind Turbine Power Generation Simulation study: Effect of Wind Speed on Wind Turbine Power Generation
Experiment 12	Hybrid (Solar-Wind) Power System Simulation study on Hybrid (Solar-Wind) Power System.
Experiment 13	Hybrid (Solar-Wind- battery) Power System Simulation study on Hybrid (Solar-Wind- battery) Power System.
Experiment 14	Effect of pollution on the performance of the PV system Experiment : Effect of pollution on the performance of the PV system

المشرفين على المختبر : الأستاذ المساعد الدكتور محمد طارق ياسين / رئيس قسم الهندسة الكهربائية

الأستاذ المساعد الدكتور عمر شرف الدين يحيى

مسؤول المختبر : علي عباوي محمد / مدرس

كادر المختبر : علي عباوي محمد / مدرس

كرم خير الله محمد / مدرس مساعد

رغد اديب عثمان / مدرس مساعد

بلال عقيل فتحي / مهندس

Laboratory supervisors :

- Assist. Prof. Dr. Mohammed Tariq Yaseen/Head of Department of Electrical Engineering.
- Assist. Prof. Dr. Omar Sh. Al-Yozbaky

Laboratory official: Ali Abbawi Mohammed Alabbawi / Lecturer

Laboratory staff : Ali Abbawi Mohammed Alabbawi / Lecturer

Karam Khairullah Al-Araji/ Assist. Lecturer

Raghad Adeeb Othman / Assist. Lecturer

Bilal Aqeel Fathi / Engineer





محافظة طبرستان



ممنوع التدخين





THREE PHASE TRANSFORMER LAB. BL-7004

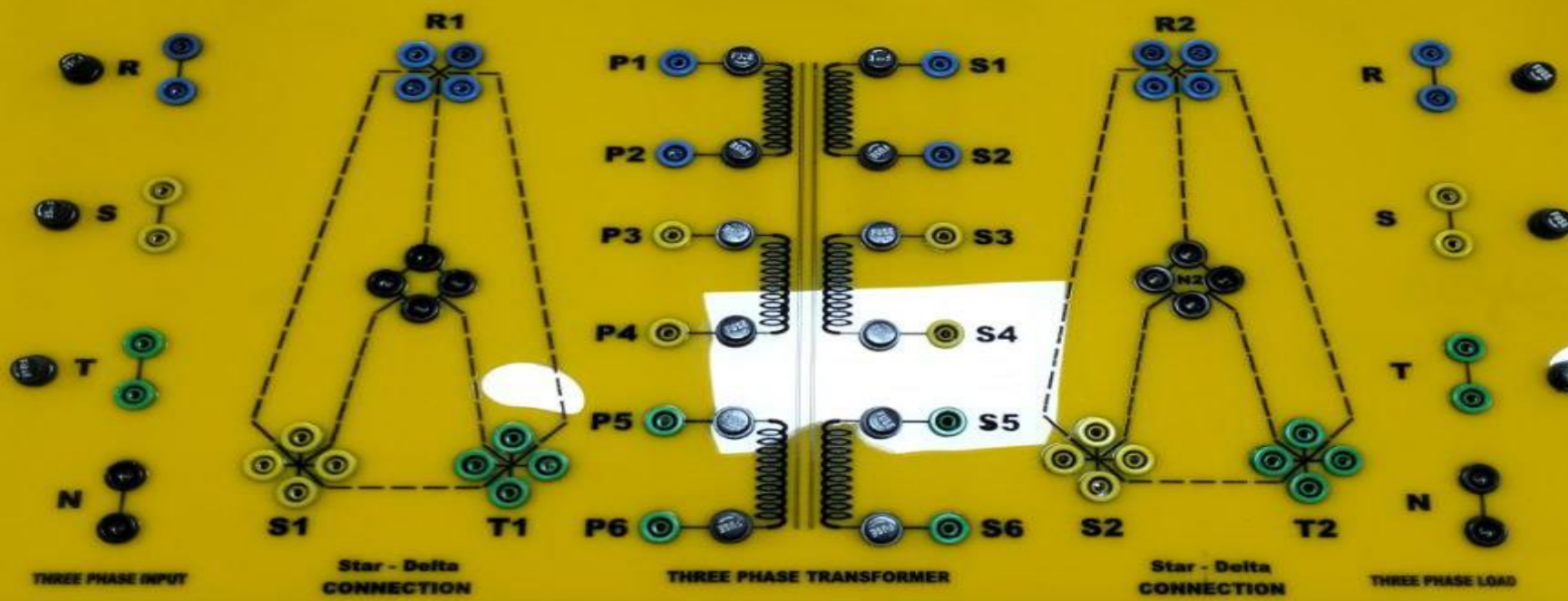


Main

A1	V1
A2	V2
A3	V3
A4	V3
A5	N
A6	N



A1	V1
A2	V2
A3	V3
A4	V3
A5	N
A6	N



THREE PHASE INPUT

Star - Delta CONNECTION

THREE PHASE TRANSFORMER

Star - Delta CONNECTION

THREE PHASE LOAD



