PYTHON

Python is a high level, general purpose, interpreted, interactive and object oriented programming language.

APPLICATIONS-

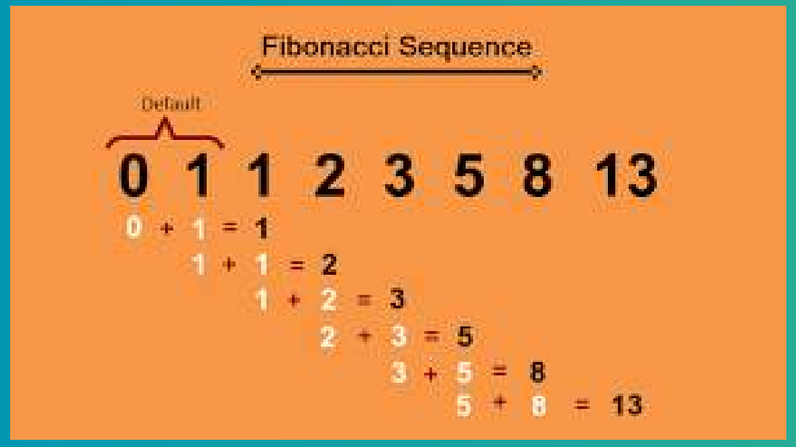
- Web developement
- Game develo[ement
- Scientific and numeric applications
- Artificial intelligence and machine learning based applications
- Data science related applications
- Desktop GUI applications
- Software developement
- Enterprise level/business applications
- Education programs and training courses
- Web scraping applications
- Image processing and graphic design applications
- Data analysis

FEATURES-

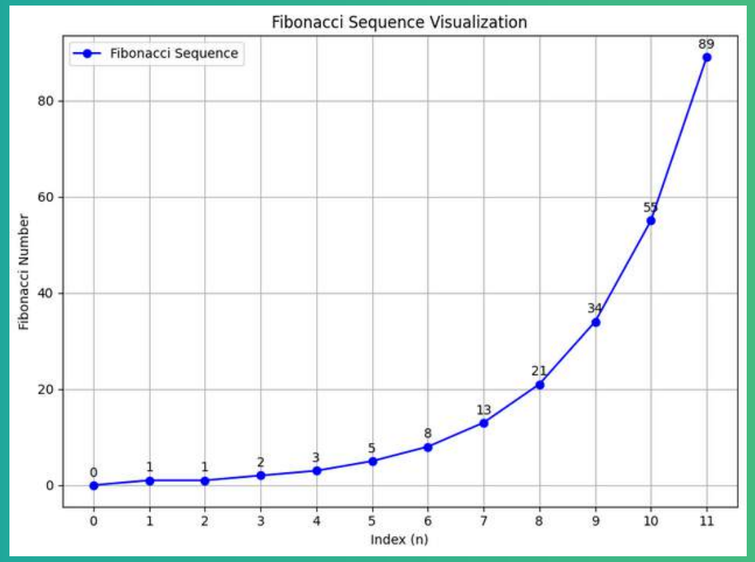
- Simple and easy to learn.
- Freeware and opensource
- Dynamically typed
- Object oriented programming and procedure oriented programming
- Extensive library
- Embedded extensible
- Interpreted
- portability
- plattform independent

CODING USING PYTHON

Here is a simple python code to generate the fibonacci sequence.




```python
def fibonacci(n):
  fib_series = []
  a, b = 0, 1
  for _ in range(n):
    fib_series.append(a)
    a, b = b, a + b
  return fib_series
```



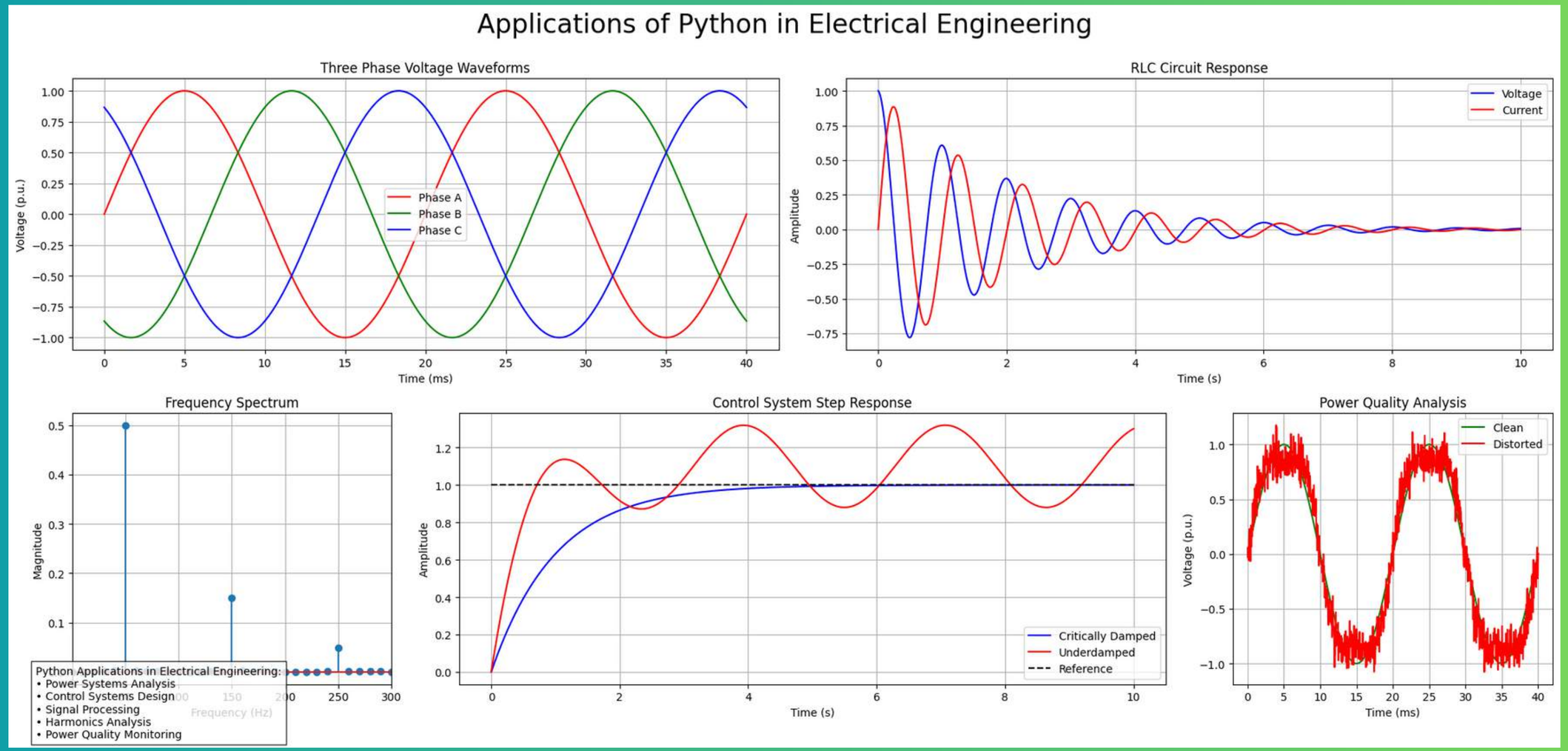

```python
# Example: Generate the first 10 Fibonacci numbers
n = 10
print(fibonacci(n))
```

Output for n = 10:

[0, 1, 1, 2, 3, 5, 8, 13, 21, 34]

DATA VISUALISATION USING PYTHON

Python has become one of the most popular tools for data visualization due to its flexibility, ease of use, and a wide variety of libraries.Python is used in data visualization to analyze power systems, plot waveforms, monitor real-time signals, visualize circuit simulations, and assess data from sensors or IoT devices using libraries like Matplotlib, Seaborn, and Plotly.



CONTROL SYSTEM SIMULATOR

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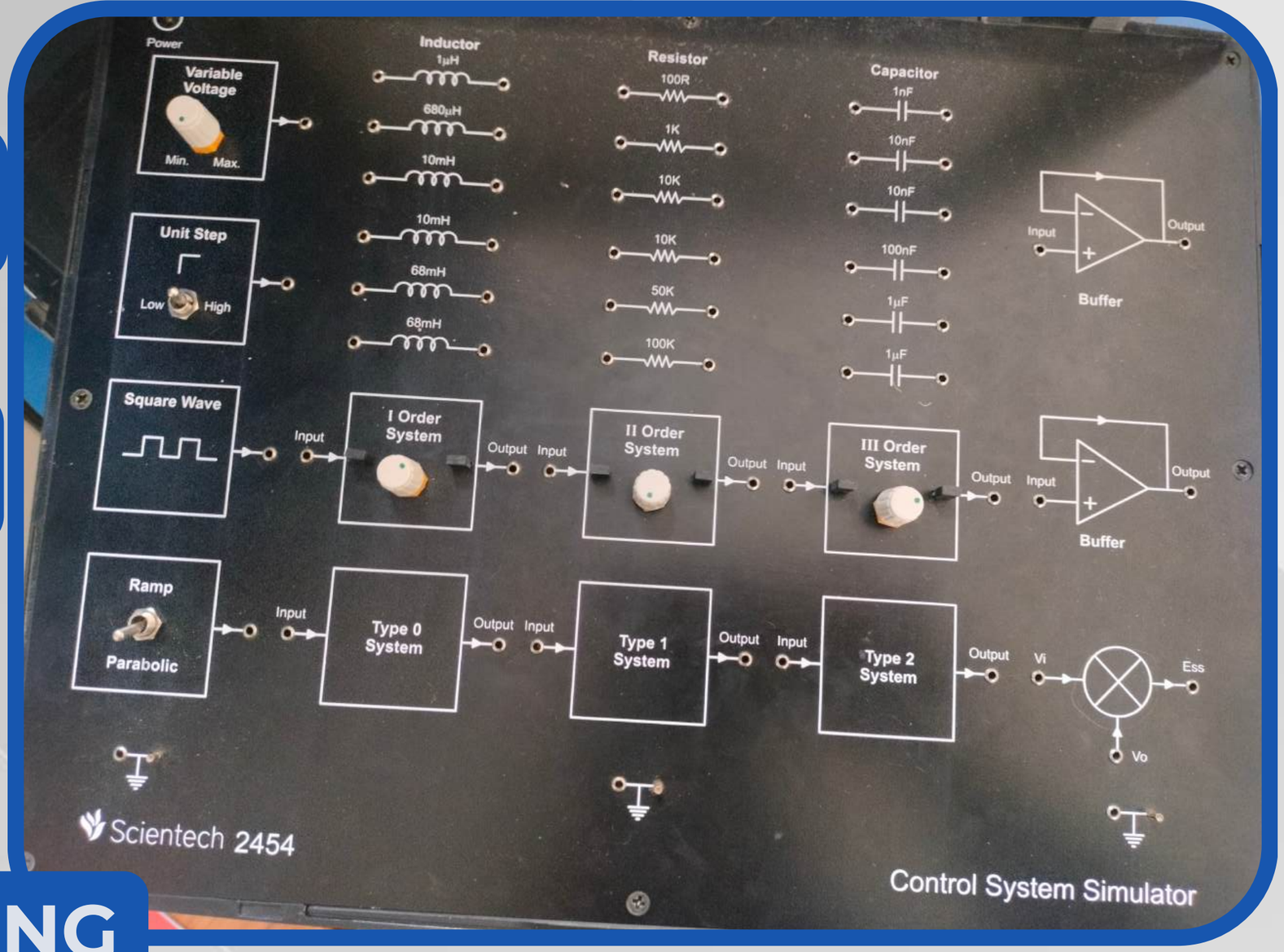


SCOPE OF LEARNING

To observe the First Order control system for different values of the Damping Ratio at different values of resistance

To observe the Second Order control system for different values of the Damping Ratio at different values of resistance

To observe the Third Order control system for different values of the Damping Ratio at different values of resistance

To observe the Type0 control system Steady State Error (Ess) for Unit Step or Square wave input

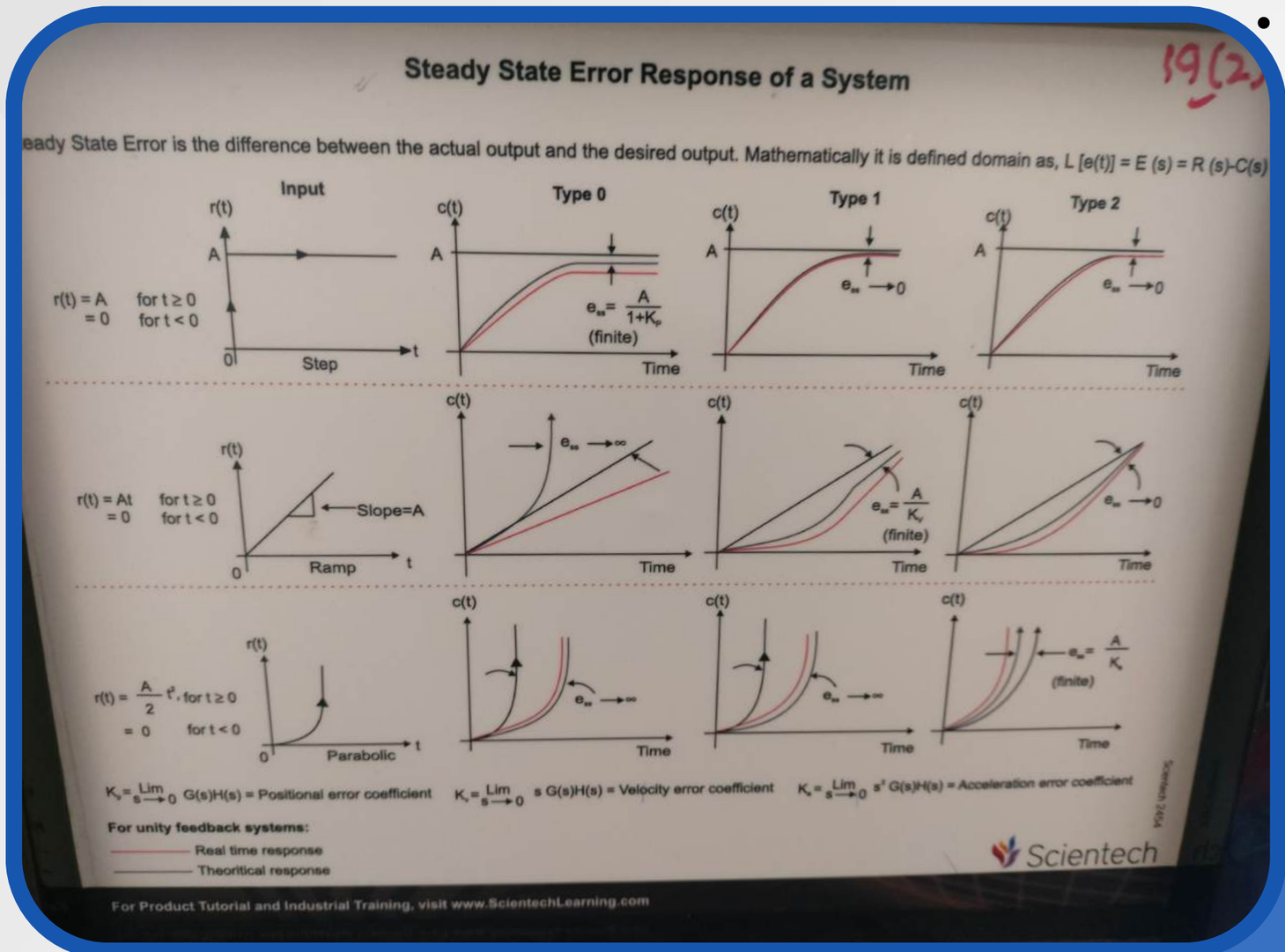
To observe the Type0 control system Steady state error (Ess) for Ramp as input

To observe the Type0 control system Steady State Error (Ess) for Parabolic as input

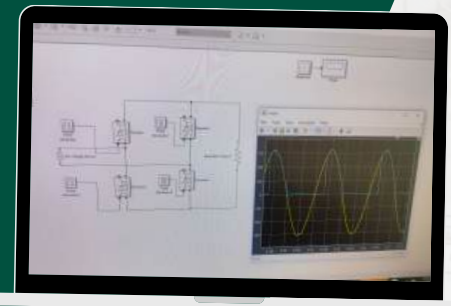
To observe the Type1 control system Steady State Error (Ess) for Unit Step or Square wave input

To observe the Type1 control system Steady State Error (Ess) for Ramp as input

CONTROL SYSTEM SIMULATOR HELPS TO GAIN KNOWLEDGE ABOUT ORDER AND TYPE OF CONTROL SYSTEM. SQUARE WAVE, RAMP WAVE, PARABOLIC WAVE, UNIT STEP SIGNAL AND VARIABLE DC SUPPLY ARE PROVIDED ON BOARD AS STANDARD INPUTS. ON BOARD RESISTANCE, CAPACITOR AND INDUCTOR BANKS FOR STUDYING DIFFERENT COMBINATION FOR THE ORDER OF A SYSTEM ARE ALSO AVAILABLE.

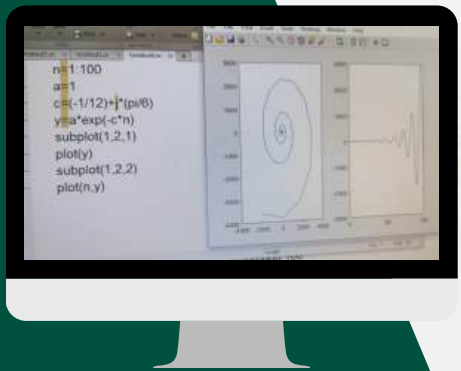


MATLAB



Key Features of MATLAB

- Interactive Environment
- Data Analysis & Visualization
- Advanced data manipulation, statistical analysis, and powerful visualization tools for creating plots, charts, and graphs.
- Algorithm Development:
- Develop, test, and refine algorithms efficiently, especially in matrix operations, signal processing, and system modeling.
- Simulink Integration:
- Simulink is MATLAB's environment for multi-domain simulation and model-based design, particularly in control systems, communications, and embedded systems.
- Toolboxes:
- MATLAB offers a wide array of specialized toolboxes for different applications, including image processing, machine learning, signal processing, robotics, and more.



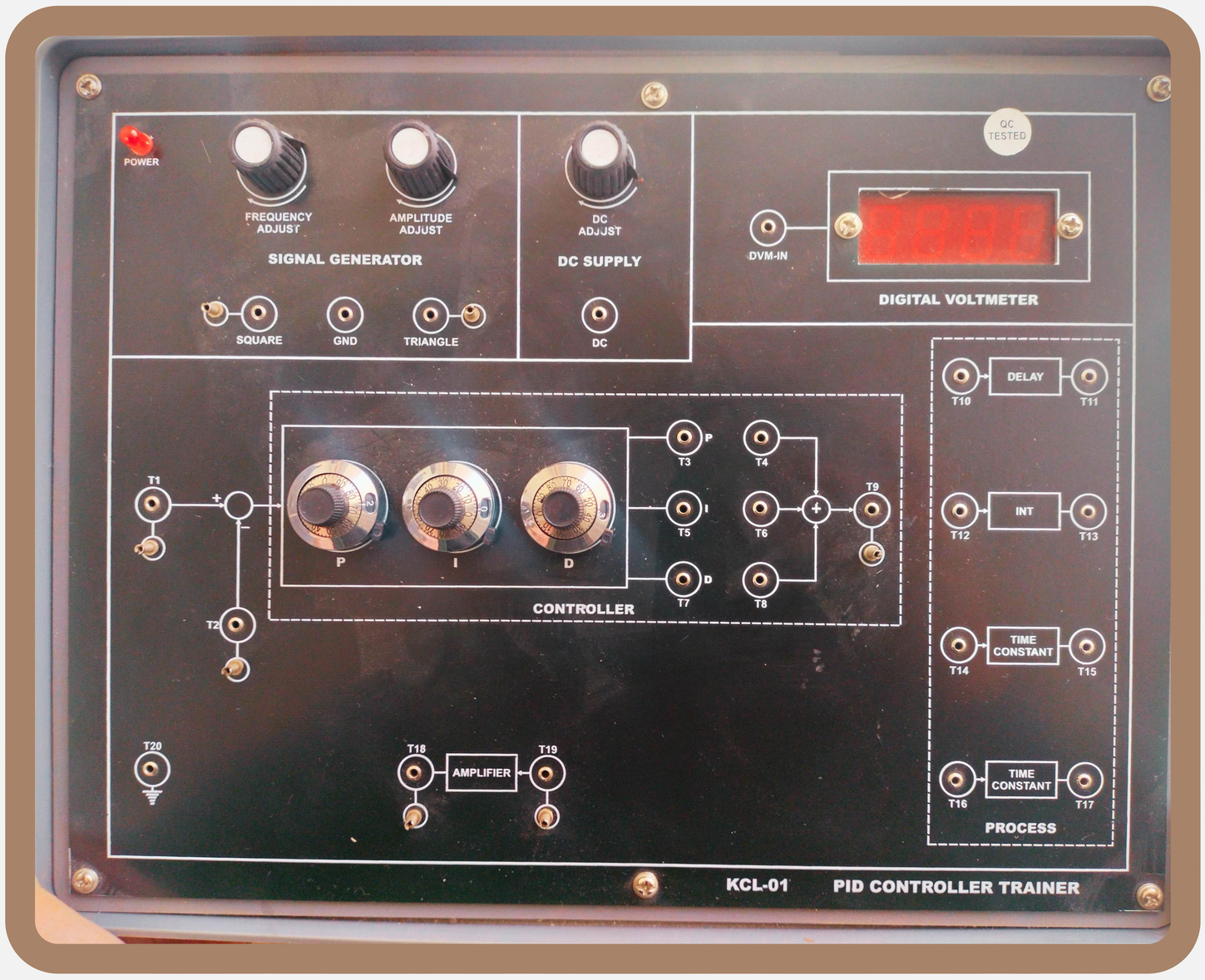
Why Use MATLAB?

- MATLAB's syntax is easy to learn for both beginners and experienced programmers.
- It's designed to simplify complex mathematical computations.
- MATLAB is used across various fields, including:
- Engineering (Control systems, Electrical circuits)
- Data Science & Machine Learning
- Robotics and Automation
- Signal and Image Processing
- MATLAB is widely used in industry for product development, prototyping,
  and testing due to its flexibility and extensive library.

PID CONTROLLER TRAINER

CONTROL SYSTEM

- The P, PI, PID Controller Simulator Trainer (KCL-01) device allows users to simulate real-world scenarios and master the intricacies of control systems. Developed specifically for PID Controller enthusiasts, this trainer offers hands-on experience in tuning and optimizing PID parameters. . Unlock the potential of PID control with the P, PI, PID Controller Simulator Trainer (KCL-01), an invaluable tool for professionals and students alike

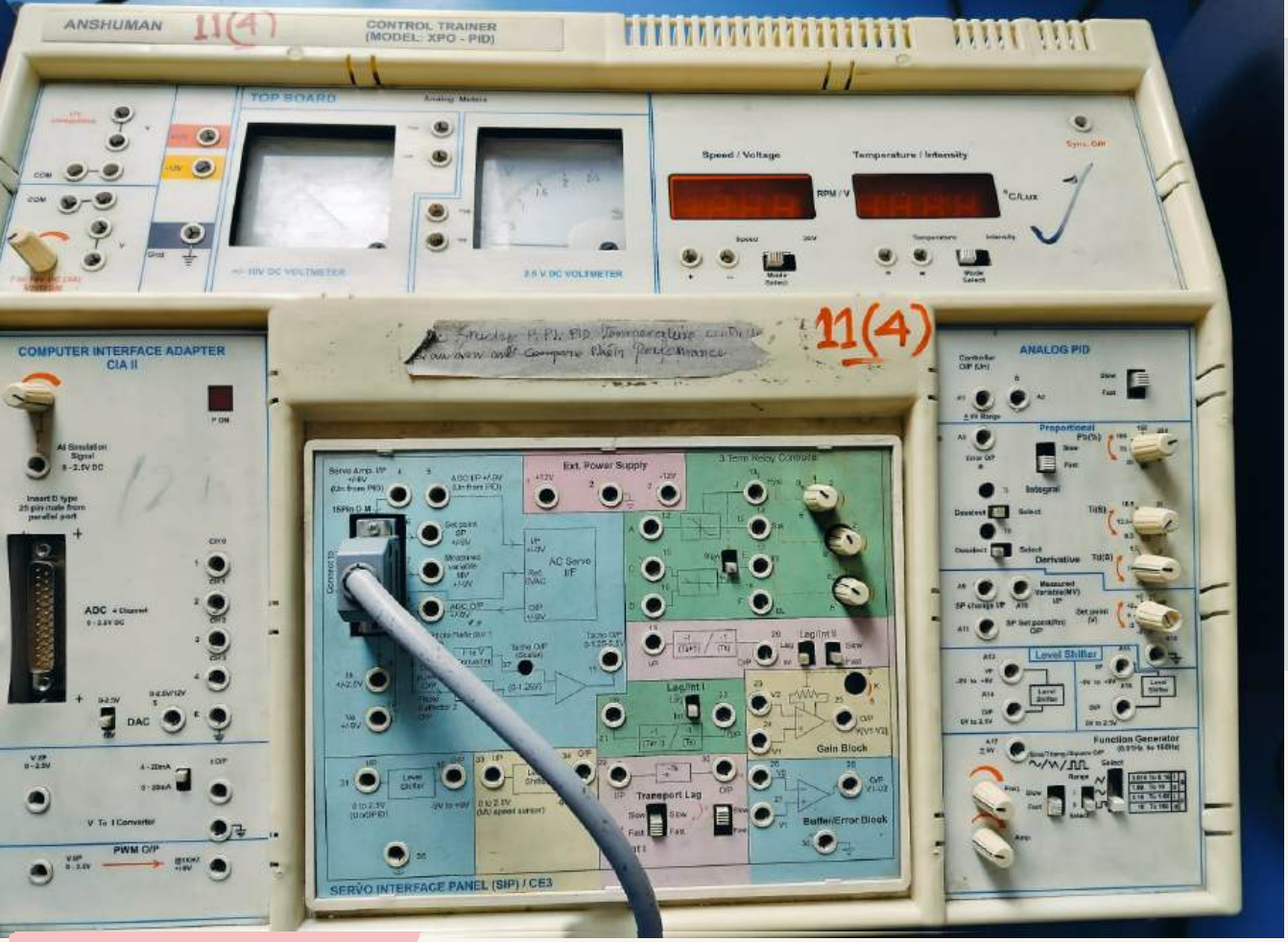


LIST OF EXPERIMENTS

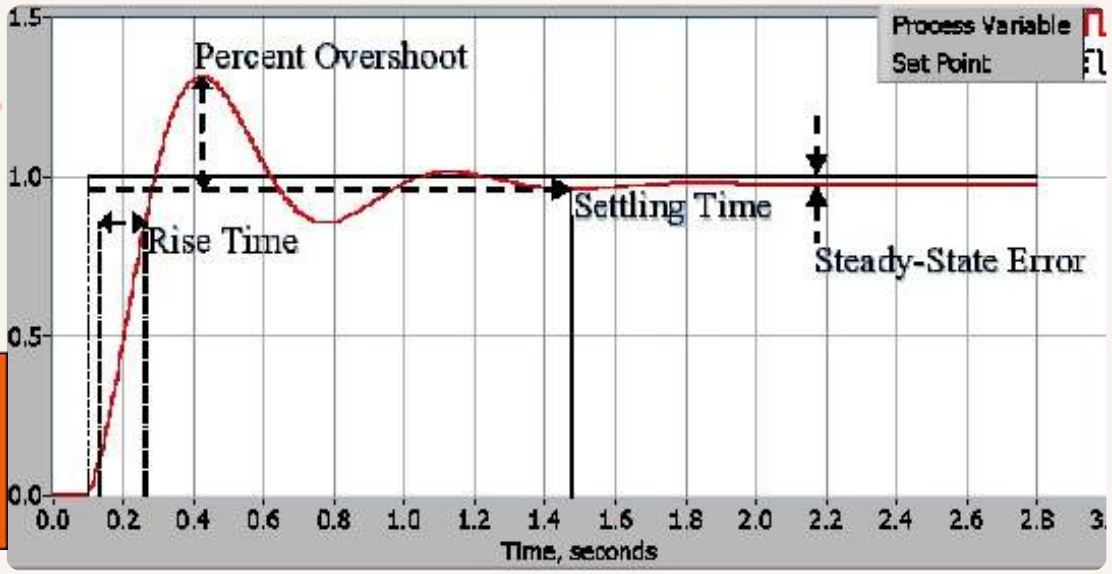
- **OPEN LOOP RESPONSE OF VARIOUS PROCESS CONFIGURATIONS LIKE COMBINATION OF TIME CONSTANTS, DELAYS ETC.**
- **STUDY OF CLOSED LOOP RESPONSE FOR ABOVE.**
- **P, PI, PD AND PID DESIGN AND PERFORMANCE EVOLUTION IN EACH CASE.**

The experimental unit consists of simulated building blocks like error detector, dead time, integrator and time constants, which may be configured into a variety of systems. PID section with adjustable proportional gain, derivative and integral time constants provide the control action. Built-in set value, square and triangular sources enable the students to study the response on a CRO. The accompanying literature includes system description, theory, experimental procedure and typical results. An important feature of the system is that the simulated blocks are designed to operate at frequencies suitable for CRO viewing. The effect of controller parameter adjustments are therefore seen immediately.

CONTROL TRAINER KIT



ANSHUMAN XPO-PID



PRODUCT FEATURES

- Analog PID Control
- Computer Interface Adapter
- ADC/DAC Functionality
- 3-Term Relay Control
- Integrated Function Generator

EXPERIMENTAL USE

- Conduct experiments in PID tuning for real-time systems.
- Demonstrate servo motor control and automation principles.
- Gain practical exposure to control system behavior and performance.