# Circuit Theory & Electronic Devices Trainer

## EE-37000

EDU-LABS

BUATAN MALAYSIA
MADE IN MALAYSIA

The Circuit Theory & Electronic Devices Trainer EE-37000 is a comprehensive and self-contained system suitable for tuition and experimentation with wide range of electronic circuits.

**Features**

- Ideal for electronics circuit experiments and design exercises.
- Integrated training system, with complete curriculum.
- Built-in power supplies and test facilities for easy and efficient experimentation.
- Large breadboard for circuit design and prototyping.
- 17 experiment modules form basis for over 110 fully documented experiments.
- Main units and experiment modules also available separately for economical construction of class sets.

**Experiment Modules**

17 (Seventeen) modular experiments modules form the basis for over 110 experiments detailed in the comprehensive experiment manual. Each module contains the experiment circuit which is clearly illustrated by a circuit diagram on its top panel. Fault Simulator are also incorporated into the modules for simulating fault situations.

- MET-EM01 Clipping & Clamping Experiment Module
- MET-EM02 Rectifier, Differential & Integrator Experiment Module
- MET-EM03 Transistor Amplification Experiment Module
- MET-EM04 Field Effect Transistor (FET) Circuits Experiment Module
- MET-EM05 Multi-stage Amplification Circuits Experiment Module
- MET-EM06 OTL Amplifier Circuit Experiment Module
- MET-EM07 OCL Amplifier Circuit Experiment Module
- MET-EM08 Oscillator Circuits (1) Experiment Module
- MET-EM09 Oscillator Circuits (2) Experiment Module
- MET-EM10 Voltage Regulator Experiment Module

- MET-EM11 Amplitude Modulation & Demodulation Experiment Module
- MET-EM12 Frequency Modulation & Demodulation Experiment Module
- MET-EM13 Op-Amp Circuits (1) Experiment Module
- MET-EM14 Op-Amp Circuits (2) Experiment Module
- MET-EM15 Op-Amp Circuits (3) Experiment Module
- MET-EM16 Op-Amp Circuits (4) Experiment Module
- MET-EM17 Op-Amp Circuits (5) Experiment Module

The full list of experiments performed using the above modules and detailed in the experiment manual are:

**1. Diode Characteristics Experiments (PN-Junction)**

a) Silicon diode
b) Germanium diode
c) Zener diode
d) DC current measurement
e) Light emitting diode (LED)
f) Photo diode

**2. Diode Clipping & Clamping Circuits Experiments**

a) Clipping circuit (1)
b) Clipping circuit (2)
c) Clamping circuit (1)
d) Clamping circuit (2)

**3. Rectifier Circuits Experiments**

a) Half wave rectifier circuit
b) Full wave rectifier circuit
c) Bridge rectifier circuit
d) Dual power rectifier circuit
e) Voltage magnifying rectifier circuit

**4. Differential & Integrator Circuits Experiments**

a) RC direct current charge/discharge circuit
b) Differential circuit: square wave input
c) Differential circuit: sine wave input
d) Integrator circuit: square wave input
e) Integrator circuit: sine wave input
f) RL circuit

**5. Transistor Characteristics Experiments**

a) PNP transistor
b) NPN transistor

**6. Transistor Amplification Circuits Experiments**

a) Common emitter transistor amplification circuit
b) Common base transistor amplification circuit
c) Common collector transistor amplification circuit
d) Switching type transistor circuit
e) Darlington's circuit

**7. Field Effect Transistor (FET) Experiments**

a) Junction type FET (JFET)
b) Metal-oxide semiconductor FET (MOSFET)

## 8. FET Amplification Circuits Experiments

a) JFET common source amplification circuit: self-bias
b) JFET common source amplification circuit: divide-bias
c) JFET drain source amplification circuit: self-bias
d) JFET drain source amplification circuit: divide-bias
e) MOSFET amplification circuit: biased (1)
f) MOSFET amplification circuit: biased (2)

## 9. Multi-Stage Amplification Circuits Experiments

a) RC coupled amplification circuit
b) Direct coupled amplification circuit
c) Transformer coupled amplification circuit
d) Push-pull amplification circuit
e) OTL amplification circuit
f) OCL amplification circuit
g) IC amplification circuit

## 10. Transistor Negative Feedback Circuits Experiments

a) Serial Voltage negative feedback circuit
b) Parallel Voltage negative feedback circuit
c) Serial current negative feedback circuit
d) Parallel current negative feedback circuit

## 11. Transistor Positive Feedback Circuits Experiments

a) Low frequency sine wave oscillating circuit
    1. RC phase-shifting oscillating circuit
    2. Wien bridge oscillator circuit
b) High frequency sine wave oscillating circuit
    1. Hartley oscillator circuit
    2. Colpitts oscillator circuit
c) Crystal oscillating circuit
d) Astable oscillating circuit
e) Monostable oscillating circuit
f) Bistable oscillating circuit
g) Intermittent oscillating circuit
h) Schmitt's trigger circuit
i) Sawtooth wave oscillating circuit

## 12. Regulated Voltage/Constant Current Circuits Experiments

a) Regulated Voltage circuit with Zener diode
b) Regulated Voltage circuit with Zener diode/transistor
c) Regulated adjustable Voltage circuit
d) Current-limiting regulated Voltage circuit
e) Regulated Voltage circuit with IC
f) Constant current circuit

## 13. Modulation & Demodulation Experiments

a) Amplitude modulation circuit (AM)
b) Amplitude modulation detection circuit

c) Amplitude demodulation circuit
d) Frequency modulation circuit (FM)
e) Frequency demodulation circuit

### 14. Operational Amplifier Characteristics Experiments

a) Transistor differential amplification circuit
b) Characteristics of op-amps
    1. Input impedance measurement
    2. Output impedance measurement
    3. Bandwidth measurement
    4. Slew rate measurement
    5. Offset Voltage measurement (1)
    6. Offset Voltage measurement (2)

### 15. Op-Amp Amplification Characteristics Experiments

a) Inverse amplification
b) Non-inverse amplification
c) Voltage-follower circuit
d) Difference amplification (subtractor)
e) Sum amplification (adder)
f) Clipping circuit
g) Constant Voltage circuit
h) Constant current circuit
i) Differential circuit
j) Integrator circuit

### 16. Op-Amp Application Circuits Experiments (1)

a) Logarithm amplification circuit
b) Exponential amplification circuit
c) Peak value detection circuit
d) Precision clipping circuit
e) Voltage regulator circuit
f) Sampling/hold circuit
g) Instrument amplification circuit

### 17. Op-Amp Application Circuits Experiments (2)

a) High pass amplification circuit
b) Low pass amplification circuit
c) Band pass amplification circuit
d) RIAA amplifier circuit
e) Tone controller circuit
f) Single power inverse amplification circuit

### 18. Op-Amp Oscillating Circuit - Positive Feedback Experiments

a) Comparator
b) Schmitt trigger
c) Window type comparator
d) Monostable multivibrator
e) Astable multivibrator
f) Sine wave oscillation circuit
    1. RC oscillator
    2. Wien oscillator

## MAIN UNIT SPECIFICATIONS

### 1. DC Power Supplies Module

Fixed Output: +5V/0.5A, -5V/0.5A, +12V/0.5A, -12V/0.5A
Variable Output: +0V ~ +23V/0.5A, -0V ~ -23V/0.5A

### 2. AC Power Supplies Module

19V–15V–9V–0V–9V–15V-19V

### 3. Function Generator Modules

Sine, Triangle and Square waveform output
Frequency range: 1Hz to 1MHz in 6 decades
With fine adjust, Amplitude and DC offset control
TTL Mode: 1Hz to 1MHz in 6 decades
Six frequency ranges:

- 1Hz to 10Hz
- 10Hz to 100Hz
- 100Hz to 1KHz
- 1KHz to 10KHz
- 10KHz to 100KHz
- 100KHz to 500KHz

Sine wave output: 0 to 12V peak to peak variable
Triangle wave output: 0 to 8V peak to peak variable
Square wave output: 0 to 22V peak to peak variable

### 4. Removable Solderless Breadboard Module

Interconnected nickel plated with a total of 2200 tie points nickel plated contact, fitted all DIP sizes and all components with lead and solid wire in diameter of AWG #22-30 (0.3-0.8mm)

### 5. Two Logic Output Switches Module

Provide two sets of logical output $X / \overline{X}$ & $Y / \overline{Y}$

### 6. Two Pulse Switches Module

Provide two sets of pulse output $A / \overline{A}$ & $B / \overline{B}$
2 units push button switch contain switches debouncer for eliminating the bounce caused by switch from "open" to "close" or from "close" to "open" position.

### 7. 16-Bits LED Indicators with buffer Module

Sixteen LED's separate input terminals in three colors. (RED, Yellow & Green). The LED will be lighted up when input is at "HI Level", and it will be turned off when it is at no input or at "LO Level". Capable for Traffic Light Experiments.

### 8. 16-Bits HI/LO Data Output Switches Module

16 units slide switches and corresponding output terminals. When switch is set at "down" position, the output is LO level; contrarily, it is to be HI level when setting at "up" position.

### 9. TTL/CMOS Selection Switch

Select TTL or CMOS Mode for data switches

### 10. Two digits 7-segment LED Display Module

Numerical designs and resultant display

### 11. Speaker Module

8Ohm, 0.25W with Audio Amplifier

### 12. Potentiometer Module

With 1K, 100K and 500K Ohm Potentiometers

### 13. Adaptors Module

2 Channels 4mm Banana and 2 Channels BNC Adaptor

The ADT-7000 is shipped with a comprehensive CD Format Experiments Manual, Instruction Manual with **Self Maintenance Guide** and a power cord.

Power Supply: 240VAC, 50Hz (Fused Protected)
Dimensions: (W x D x H) 550 x 280 x 90mm
Weight: 8 kgs

**Note: Due to products continuous development process, layout and specification may change without prior notices.**