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Technical Training Systems
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DLCT-2020

Digital Logic Circuit Trainer kit

DIGITAL LOGIC CIRCUIT TRAINER

1
Basic Logic Gates Circuits

2
Combinational Logic Circuits

3
Extended Combinational
Logic Circuits

4
Clock Generator Circuits

5
Sequential Logic Circuits

6
Memory Circuits

7
Converter Circuits

8
Logic Application Circuits

DESCRIPTION

- *A complete laboratory training system.*
- *Understanding the theory and application of digitai logic circuits.*
- *Suitable for both technician and beginner of electronic and electrical students.*

OBJECTIVES

- *Design and implementation of basic logic gates circuits and clock generator circuits.*
- *Design and implementation of combinational logic circuits and sequential logic circuits.*
- *Design and implementation of memory circuits and converter circuits.*
- *Design and implementation of logic application circuits.*

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Module One 1

Experiment 1: Logic Gates Structure Circuits (DL, RTL, TTL, CMOS)

Input Data Length: 2 bits; Input Data Mode: Dip Switch

Experiment 2: Logic Gates Circuits

Include Logic Gates: AND Gate; NAND Gate; NOT Gate; OR Gate; NOR Gate; XOR Gate

Experiment 3: Voltage and Current Measurement (TTL, CMOS)

Voltage Measurement: V1H, V1l , VOH' VOl; Current Measurement: IOH' IOl

Experiment 4: Interface between Logic Gates Circuits (TTL and CMOS Transform)

TTL to CMOS Transform: Input: 5 V; Output: 12 V; CMOS to TTL Transform: Input: 12 V; Output: 5 V

Experiment 5: Transmission Delay Measurement (TTL, CMOS)

TTL Transmission Delay: 20.8 nS; CMOS Transmission Delay: 99.1 nS

Module Two 2

Experiment 1: 4 Bits Comparator Circuit

Input Data Length: 4 bits; Input Data Mode: Dip Switch;

Output Data Length: 3 bits; Data Display Mode: LED Display

Experiment 2: 9 Bits Parity Generator

Input Data Length: 9 bits; Input Data Mode: Dip Switch;

Output Data Length: 2 bits; Data Display Mode: LED Display

Experiment 3: Tristate and Schmitt Gate Circuits,

Tristate Gate: Data Length: 1 bits; Input Data Mode: Dip Switch ; Schmitt Gate: Measurement V1H, V1l , VOH' VOl

Experiment 4: Half Adder and Full Adder

Half Adder: Input Data Length: 2 bits; Input Data Mode: Dip Switch

Output Data Length: 2 bits; Data Display Mode: LED Display

Full Adder: Input Data Length: 3 bits; Input Data Mode: Dip Switch

Output Data Length: 2 bits; Data Display Mode: LED Display

Experiment 5: Half Subtractor and Full Subtractor,

Half Subtractor: Input Data Length: 2 bits; Input Data Mode: Dip Switch,

Output Data Length: 2 bits; Data Display Mode: LED Display

Full Subtractor: Input Data Length: 3 bits; Input Data Mode: Dip Switch

Output Data Length: 2 bits; Data Display Mode: LED Display

Module Three 3

Experiment 1: Arithmetic Logic Unit (ALU) Circuit

Input Data Length: 4 bits; Input Data Mode: Dip Switch

Output Data Length: 4 bits; Data Display Mode: LED Display; Operation instruction: 16 Types

Experiment 2: Encoder Circuit

Input Data Length : 8 bits; Input Data Mode: Dip Switch; Output Data Length: 3 bits; Data Display Mode: LED Display

Experiment 3: Decoder Circu it

Input Data Length : 3 bits; Input Data Mode: Dip Switch ; Output Data Length: 8 bits; Data Display Mode: LED Display

Experiment 4: Multiplexer Circuit

Input Data Length: 4 bits; Input Data Mode: Dip Switch

Output Data Length: 1 bits; Data Display Mode: LED Display

Experiment 5: Demultiplexer Circuit

Input Data Length : 1 bits; Input Data Mode: Dip Switch; Output Data Length: 4 bits; Data Display Mode: LED Display

Experiment 6: Digitally Controlled Analog Multiplexer and Demultiplexer Circuits

Multiplexer: Input Voltage: O V - 5 V; Input Quantity: 2; Output Voltage: O V - 5 V; Output Quantity: 1

Demultiplexer: Input Voltage: O V - 5 V; Input Quantity: 1; Output Voltage: O V - 5 V; Output Quantity: 2

Module Four 4

Experiment 1: Constructing Oscillator Circuit with Basic Log ic Gates and Schmitt Gates

Basic Logic Oscillator: Output Frequency: 3.58 MHz; Schmitt Gates Oscillator: Output Frequency: 3.58 MHz

Experiment 2: Voltage Controlled Oscillator Circuit (Output Frequency: 26.8 kHz - 35.5 kHz)

Experiment 3: BJT Astable Multivibrator Oscillator Circuit (Output Frequency 160 kHz)

Experiment 4: Operational Amplifier Oscillator Circuit (Output Frequency: 2.56 kHz)

Experiment 5: 555 Astable Multivibrator and Monostable Multivibrator Oscillator Astable Multivibrator: 4.75 Hz; Monostable Multivibrator: User Controlled

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Module Five 5

Experiment 1: RS Flip-flop Circuit
Input Data Length: 2 bits; Input Data Mode: Dip Switch; Output Data Length: 1 bits; Data Display Mode: LED Display
Experiment 2: JK Flip-flop Circuit
Input Data Length: 2 bits; Input Data Mode: Dip Switch; Output Data Length: 2 bits; Data Display Mode: LED Display
Experiment 3: D Flip-flop Circuit
Input Data Length: 1 bits; Input Data Mode: Dip Switch; Output Data Length: 2 bits; Data Display Mode: LED Display
Experiment 4: Asynchronous Counter Circuit
Output Data Length: 4 bits; Data Display Mode: LED Display
Experiment 5: Synchronous Counter Circuit
Input Data Mode: Dip Switch; Output Data Length: 5 bits; Data Display Mode: LED Display
Experiment 6: Presetably Synchronous Counter Circuit
Presetably Data Length: 4 bits; Input Data Mode: Dip Switch
Output Data Length: 5 bits; Data Display Mode: LED Display; Count Mode: Up Count or Down Count

Module Six 6

Experiment 1: Constructing ROM Circuit with Diodes
Store Data Length: 2 bits; Data Display Mode: LED Display
Experiment 2: Constructing RAM Circuit with D Flip-flop
Input Data Length: 4 bits; Input Data Mode: Dip Switch; Output Data Length: 4 bits; Data Display Mode: LED Display
Experiment 3: Programable ROM Circuit
Experiment 4: 64 Bits RAM Circuit
Input Data Length: 4 bits; Input Data Mode: Dip Switch; Output Data Length: 4 bits; Data Display Mode: LED Display

Module Seven 7

Experiment 1: OPAADC Circuit
Analog Input: O V-5 V; Data Display Mode: LED Display; Resolution: 4 bits
Experiment 2: ADC0804 ADC Circuit
Analog Input: O V-5 V; Data Display Mode: LED Display; Resolution: 8 bits
Experiment 3: 4 Bits R-2R DAC Circuit (Digitai Input: 4 bits; Analog Output: O V-5 V)
Experiment 4: Unipolar DAC0800 DAC Circuit
Digitai Input: 8 bits; Input Data Mode: Dip Switch; Analog Output: O V - 5 V; Step Value: 0.019 V
Experiment 5: Bipolar DAC0800 DAC Circuit
Digital Input: 8 bits; Input Data Mode: Dip Switch; Analog Output: -5 V - 5 V; Step Value: 0.038 V

Module Eight 8

Experiment 1: Electronic Voting Circuit (7408, 7404, 7432, 7486)
Experiment 2: Electronic Wheel-amusement Circu it (Vcc = 12 V; IC: 555, CD4017B)
Experiment 3: Electronic Competition-answer Circuit (V cc = 12 V; IC: CD4011 B)
Experiment 4: Traffic Light Circuit (Vcc = 12 V; IC: 555, CD4017B)

Data Input	**Basic Logic Gates Circuits** **Combinational Logic Circuits** **Extended Combinational Logic Circuits** **Clock Generator Circuits** **Sequential Logic Circuits** **Memory Circuits** **Converter Circuits** **Logic Application Circuits**	**Data Output**

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2-Combinational Logic Circuits	Experiment 1: 4 Bits Comparator Circuit Experiment 2 : 9 Bits Parity Generator Experiment 3: Tristate and SchmiU Gate Circuits Experiment 4: Half Adder and Full Adder Experiment 5: Half Subtractor and Full Subtractor
3-Extended Combinational Logic Circuits	Experiment 1: Arithmetic Logic Unit (ALU) Circuit Experiment 2: Encoder Circuit Experiment 3 : Decoder Circuit Experiment 4: Multiplexer Circuit Experiment 5 : Demultiplexer Circuit Experiment 6: Digitally Controlled Analog Multiplexer and Demultiplexer Circuit
4-Clock Generator Circuits	Experiment 1: Constructing Oscillator Circuit with Basic Logic Gates and Schmitt Gates Experiment 2 : Voltage Controlled Oscillator Circuit Experiment 3: BJT Astable Multivibrator Oscillator Circuit Experiment 4 : Operational Amplifier Oscillator Circuit Experiment 5: 555 Astable Multivibrator and Monostable Multivibrator Oscillator
5-Sequential Logic Circuits	Experiment 1: RS Flip-flop Circuit Experiment 2 : JK Flip-flop Circuit Experiment 3: D Flip-flop Circuit Experiment 4: Asynchronous Counter Circuit Experiment 5 : Synchronous Counter Circuit Experiment 6 : Presetably Synchronous Counter Circuit
6-Memory Circuits	Experiment 1: Constructing ROM Circuit with Diodes Experiment 2 : Constructing RAM Circuit with D Flip-flop Experiment 3 : Programable ROM Circuit Experiment 4 : 64 Bits RAM Circuit
7-Converter Circuits	Experiment 1 : OPA ADC Circuit Experiment 2: ADC0804 ADC Circuit Experiment 3: 4 Bits R-2R DAC Circuit Experiment 4: Unipolar DAC0800 DAC Circuit Experiment 5: Bipolar DAC0800 DAC Circuit
8-Logic Application Circuits	Experiment 1 : Electronic Voting Circuit Experiment 2 : Electronic Wheel-amusement Circuit Experiment 3: Electronic Competition-answer Circuit Experiment 4: Traffic Light Circuit

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