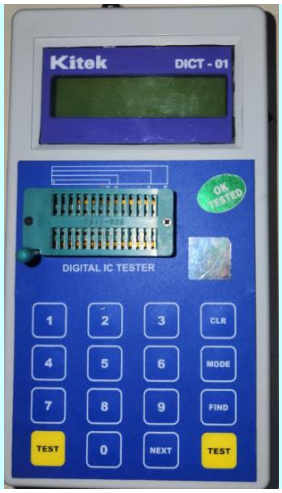
Digital Electronics Lab

Objectives:

The objective of the Digital Electronics Laboratory is to conduct advanced practical sessions, project-oriented coursework hands-on training in digital systems and logic design. The lab is designed to complement theoretical coursework and strengthen students' capability in digital logic implementation, FPGA design, and digital system testing.

Main Equipment's Available

1. **Analog Digital Trainer Kit**
   Training boards with commonly used digital ICs including gates, flip-flops, counters, multiplexers/demultiplexers, encoders/decoders, and display drivers for foundational experiments.



2. **Digital IC Tester**
   The Digital IC Tester (DICT-01) manufactured by Kitek is a compact and user-friendly instrument used for testing and verifying the functional operation of digital integrated circuits. This device is widely used in Digital Electronics Laboratories for quick fault detection and validation of logic ICs.

3. **Digital Logic IC's**
   Logic ICs are electronic components used to perform basic digital operations such as AND, OR, NOT, NAND, NOR, and XOR. These ICs operate on binary logic levels (0 and 1) and are widely used in digital circuits. Commonly used logic ICs belong to the 74xx / 74LS TTL series and are available in DIP packages, making them suitable for laboratory experiments. Logic ICs are essential for implementing combinational and sequential digital systems in Digital Electronics laboratories.

4. Digital Storage Oscilloscope (DSO)

A Digital Storage Oscilloscope (DSO) is an electronic test instrument used to observe, measure, and analyze electrical waveforms. The Rigol DS1104Z & Keysight InfiniVision oscilloscope displays voltage signals as a function of time and allows accurate measurement of parameters such as amplitude, frequency, time period, rise time, and phase difference. It supports multiple input channels, enabling simultaneous analysis of different signals. DSOs are widely used in Digital and Analog Electronics Laboratories for signal analysis, debugging, and verification of electronic circuits.

5. Multiple Power Supply

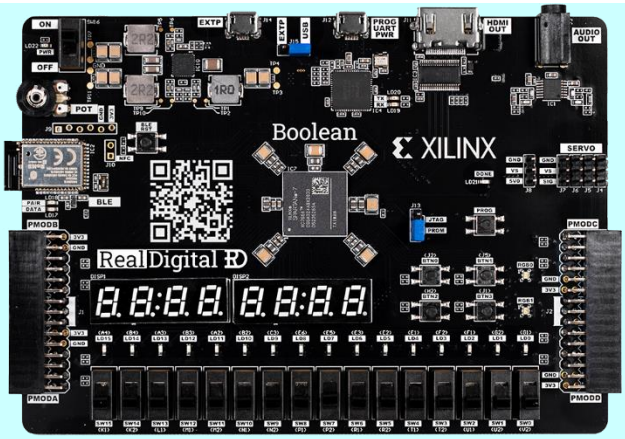
A Multiple Power Supply is a laboratory instrument used to provide regulated DC voltages required for testing and operating electronic circuits. This power supply offers multiple fixed and variable voltage outputs such as +5 V, ±12 V, ± 30 V and variable DC supply, making it suitable for both analog and digital experiments. The built-in digital display indicates output voltage and current, ensuring safe and accurate operation. Multiple power supplies are widely used in Digital Electronics, Analog Electronics, and Communication Laboratories to power trainer kits, ICs, and prototype circuits.

6. Programable Function Generator

Programmable signal generators used to generate different types of electrical waveforms such as sine, square, and triangular waves over a wide range of frequencies. It allows precise control of frequency and amplitude, making it suitable for testing and analyzing electronic circuits. Function generators are widely used in Digital Electronics, Analog Electronics, and Communication Laboratories for signal injection, frequency response analysis, and circuit verification.

7. **Mega Scope (CRO)**

A Cathode Ray Oscilloscope (CRO) is an electronic measuring instrument used to display and analyze electrical waveforms. It shows voltage variations with respect to time on a phosphor screen, allowing measurement of parameters such as amplitude, frequency, time period, and phase difference. The CRO is commonly used in Analog and Digital Electronics Laboratories for signal observation, circuit testing, and troubleshooting.



8. **AMD Spartan 7 Boolean Board**

FPGA development board based on AMD-Xilinx technology. The board is used for designing and implementing digital logic circuits using HDL languages such as VHDL and Verilog. It provides on-board peripherals including switches, LEDs, seven-segment displays, push buttons, PMOD connectors, and communication interfaces, enabling hands-on learning of combinational and sequential logic design, finite state machines, and hardware prototyping. Such boards are widely used in Digital Electronics and VLSI laboratories.