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Number Systems:

Binary System (2): Digits 0--- 1

Octal System (8): Digits 0----7

Decimal System (10): Digits 0-----9

Hexadecimal (16): Digits 0 ---- 9 ---- A---- F

Conversion from any base to decimal:

$$(32)^5 \text{ to } ()^{10} = 2 \cdot 5^0 + 3 \cdot 5^1 = (17)_{10}$$

Conversion from decimal to any base:

Using reminder method

Conversion From Octal to Binary:

By convert each number to its equivalent binary number 0 and 1 only

Conversion From Hexadecimal to Binary:

By convert each number to its equivalent binary number 0 and 1 only

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Voltage:

electric potential difference, is a physical quantity that represents the electrical potential energy per unit charge between two points in an electrical circuit or system.

Current:

the flow of electric charge in an electrical circuit ($I = Q / t$)

Current can flow in two ways: (DC) and (AC)

Resistance:

It is a measure of how difficult it is for electric charges to move through a conductor.

Ohm's law: $V = I * R$

DC and AC:

Direct current is a type of electrical current that flows continuously in one direction.

Alternating current is a type of electrical current that periodically changes direction.

Serial Connection:

the current remains the same and the total voltage is divided.

Branched Connection:

The voltage remains the same and the current is divided.

Voltage division is commonly used in circuits with resistors where different resistors in series receive different voltage drops /Current division is commonly used in circuits with parallel resistors or branches where different branches carry different currents

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Transistors:

essential components in embedded systems, providing the necessary switching, amplification, and control functions required to interface with external devices.

Its two types are: (BJTs) and (FETs).

FET:

FETs offer excellent performance and flexibility, making them a preferred choice in various embedded system designs.

Their characteristics, such as low power consumption, high input impedance, fast switching speeds, and compatibility with integrated circuit fabrication processes, contribute to their widespread usage in embedded systems across industries like consumer electronics, telecommunications, automotive, IOT devices.

The difference between logic gates and analog circuits lies in the type of signals they process and the operations they perform.

NOT gate:

known as an inverter, is a fundamental logic gate that performs the logical operation of negation.

The NOT gate can be implemented using various electronic components, such as transistors.

AND gate:

is a fundamental logic gate that performs the logical operation of conjunction or multiplication. It has two or more inputs and a single output.

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Mostly we build logic circuits based on gates, not transistors.

Volatile: Its data is lost by lose the power supply like (RAM)

Non-Volatile: Its data remains even after the power is turned off (HDD/Flash).

Logic design:

involves careful planning, simulation, and testing to ensure that the designed logic meets the system specifications and provides reliable operation.

Memory:

Flip-flops are basic memory elements that can store a single bit of information. They are commonly used to build registers, counters, and other sequential logic circuits. Flip-flops have two stable states, typically represented as 0 and 1, and can change their state based on input signals and clock signals.

8 Bit = 1 Byte

We know the structure of 1kByte memory and how we can use Data bus which is responsible for transmitting data between the various components of a computer system, such as the processor, memory, input/output devices, and other peripherals and address bus which transfers the actual data and decoder which enable the memory cell corresponding to the given address while disabling all other memory cells.

2^n =available addresses

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TIVA connected launch board: we use mainly in our course

IDE:

Code Composer Studio simplifies the development process for TI processors by providing a comprehensive set of tools and a unified environment.

Keil uvision: Can be used for educational purposes with limited code size
32k byte

Other IDE:

Atmel studio – GNU tools – IAR work bench – Microsoft visual studio