

# 15 Lecture - CS501

## Important Subjective

1. **What is the role of logic gates in digital circuit design?**

Answer: Logic gates are the basic building blocks of digital circuits, and they perform logical operations on input signals to produce output signals. They are used to create various digital circuits like adders, comparators, and multiplexers.

**What is a control signal, and how is it generated in SRC?**

Answer: Control signals are electrical signals that manage the operation of a digital circuit. In SRC, control signals are generated by the system resource controller to manage system resources like memory and CPU usage. These signals are generated based on the input signals received by the controller.

**What is the difference between combinatorial and sequential logic circuits?**

Answer: Combinatorial logic circuits perform logical operations based on the input signals and produce output signals. Sequential logic circuits, on the other hand, store information in the form of a state and use clock signals to update that state. This enables sequential circuits to perform complex operations and make decisions based on previous inputs.

**What is a flip-flop, and how is it used in digital circuits?**

Answer: A flip-flop is a sequential logic circuit that stores information in the form of a binary state. It can be used as a memory element to store data, as a clock divider to generate clock signals, or as a timing element to create delays in digital circuits.

**What is a clock signal, and why is it important in digital circuits?**

Answer: A clock signal is an electrical signal that synchronizes the operation of a digital circuit. It provides a reference timing signal to the circuit, enabling it to perform operations at specific intervals. The clock signal is critical in synchronous circuits to prevent race conditions and ensure stable circuit operation.

**What is the difference between synchronous and asynchronous circuits?**

Answer: Synchronous circuits use a clock signal to synchronize their operation, while asynchronous circuits do not use a clock signal. Synchronous circuits are more reliable, as they have a stable state and avoid race conditions, while asynchronous circuits are more flexible but are prone to errors due to their lack of synchronization.

**What is a decoder, and how is it used in digital circuits?**

Answer: A decoder is a combinatorial logic circuit that converts a binary input code into a specific output code. It is used to enable specific operations or to select specific memory addresses in digital circuits.

**What is a multiplexer, and how is it used in digital circuits?**

Answer: A multiplexer is a combinatorial logic circuit that selects one of several input signals and outputs that signal based on a selection signal. It is used to enable specific operations or to select specific memory addresses in digital circuits.

**What is a counter, and how is it used in digital circuits?**

Answer: A counter is a sequential logic circuit that generates a sequence of binary numbers based on a clock signal. It is used to count the number of events or pulses occurring in a circuit or to generate timing signals in digital circuits.

**What is a flip-flop clocked latch, and how is it used in digital circuits?**

Answer: A flip-flop clocked latch is a sequential logic circuit that uses a clock signal to store binary data. It is used as a memory element to store data, as a clock divider to generate clock signals, or as a timing element to create delays in digital circuits. It is also used to reduce the size and power consumption of a digital circuit.