

# 31 Lecture - CS302

## Important Subjective

1. **What is the purpose of a Next-State Table in digital circuit design?**

Answer: The purpose of a Next-State Table is to show the possible next states of a sequential digital circuit for each combination of present state and input. It is used in the design and analysis of sequential circuits, including finite state machines, and helps ensure that the circuit operates correctly according to its specifications.

**What are the inputs and outputs of a Next-State Table?**

Answer: The inputs to a Next-State Table are the present state of the circuit and the input to the circuit. The output of a Next-State Table is the next state of the circuit for each input combination.

**How do you construct a Next-State Table?**

Answer: To construct a Next-State Table, you first need to identify the states of the circuit and the inputs that affect the state transitions. Then, you create a table with one column for the present state and one column for the input. For each combination of present state and input, you determine the corresponding next state of the circuit.

**What is state encoding in a Next-State Table?**

Answer: State encoding is the process of assigning binary codes to the states of a circuit in a way that reduces the number of states required. It is important for efficient circuit design, as it helps to minimize the complexity of the circuit and reduce the number of flip-flops required.

**What is the significance of don't-care states in a Next-State Table?**

Answer: Don't-care states are states in a Next-State Table for which the corresponding next state value is irrelevant. They are usually denoted by an "X" or a dash (-) in the table. Don't-care states can be used to simplify the circuit design and reduce the number of gates required.

**How does a Next-State Table differ from a Truth Table?**

Answer: A Truth Table shows the output of a combinatorial circuit for each combination of input values, while a Next-State Table shows the next state of a sequential circuit for each combination of present state and input. Next-State Tables are used in the design and analysis of sequential circuits, while Truth Tables are used in the design and analysis of combinatorial circuits.

**How does a Next-State Table help in verifying the correct operation of a circuit?**

Answer: A Next-State Table helps in verifying the correct operation of a circuit by providing a systematic and comprehensive way to analyze all possible state transitions in the circuit. By examining the table, designers can ensure that the circuit behaves as intended for all possible input sequences.

**How can conflicts in a Next-State Table be resolved?**

Answer: Conflicts in a Next-State Table occur when different input combinations lead to the

same next state. These conflicts can be resolved by assigning priorities to the input combinations, such that the circuit always selects the desired next state in the case of conflicts.

**What is the role of the clock signal in a sequential circuit?**

Answer: The clock signal in a sequential circuit is used to synchronize the state transitions of the circuit. The clock signal is typically used to trigger the flip-flops in the circuit, causing them to update their outputs based on the current inputs and the present state.

**What are the advantages of using a Next-State Table in circuit design?**

Answer: The advantages of using a Next-State Table in circuit design include:

- Providing a systematic way to analyze all possible state transitions in the circuit
- Ensuring that the circuit behaves as intended for all possible input sequences
- Simplifying the design process by breaking it down into a series of state transitions
- Enabling designers to optimize the circuit performance by identifying the critical paths and potential bottlenecks.