11.1 Introduction

Sequential Circuits: Output is dependent on present and past inputs (needs memory)

Latches and Flip-flops: Used as memory devices; have one or more inputs which cause output state to change but 2 stable outputs

Feedback: output of one gate fed back to the input of another to form a closed loop.

11.4 D Flip-Flop

2 Inputs: D – data, Ck – clock (arrowhead symbol)

Output changes only in response to the clock; triggered

Rising edge: output changes on a 0 to 1 transition of the clock

Falling edge: output changes on a 1 to 0 transition of the clock

Active edge: output changes on either rising or falling edge

Q^+ - state of the output after a clock change

11.6 J-K Flip-Flop

13.1 Introduction

Parts of a sequential circuit

1. Inputs
2. Outputs
3. States (present)
4. States (next)

Types of sequential circuits

Asynchronous: no separate clock which gates the progression from one state to another

Synchronous: clock signals are used

13.2 Analysis by Signal Tracing and Timing Circuits

Basic Procedure:

Moore Machine: Circuit where the output of the sequential circuit is a function of the present state only

Mealy Machine: circuit where the output of the sequential circuit is a function of both the present state and the input.

13.3 State Tables and State Graphs

State Table: specifies the next state and output of sequential circuits in terms of the present state and inputs.

Steps to construct a state table:

Programmed Exercises

14.3 Guidelines for Construction of State Graphs