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20208067
EXP-8

AIM-

To Verify the truth table of the following Flip-Flops:

a)SR Flip Flop b)D Flip Flop

COMPONENTS REQUIRED-

COMPONENT	SPECIFICATION	QYANTITY
IC-7400	NAND GATE	1
IC-7404	NOT GATE	1
Power Supply	-	1
Bread Board	-	1
Connecting Wires	-	few

THEORY-

A Flip-Flop is a basic memory unit which can store 1-bit of digital information. It is a Bistable Electronic Circuit i.e., it has two stable states: HIGH or LOW. As a flip-flop is a bistable element, its output remains in either of the stable states until an external event (known as a trigger) is applied.

S-R TYPE FLIP FLOP -

The SR flip flop is a 1-bit memory bistable device having two inputs, i.e., SET and RESET. The SET input 'S' set the device or produce the output 1, and the RESET input 'R' reset the device or produce the output 0. The SET and RESET inputs are labelled as **S** and **R**, respectively.

Truth Table for S-R type flip flop-

Clock	R	S	Q	State
↓ or 0 or 1	X	X	Last State	No Change (Hold)
↑	0	0	Last State	No Change (Hold)
↑	0	1	1	Set
↑	1	0	0	Reset
↑	1	1	Not Applied (?)	Forbidden

D-TYPE FLIP FLOP-

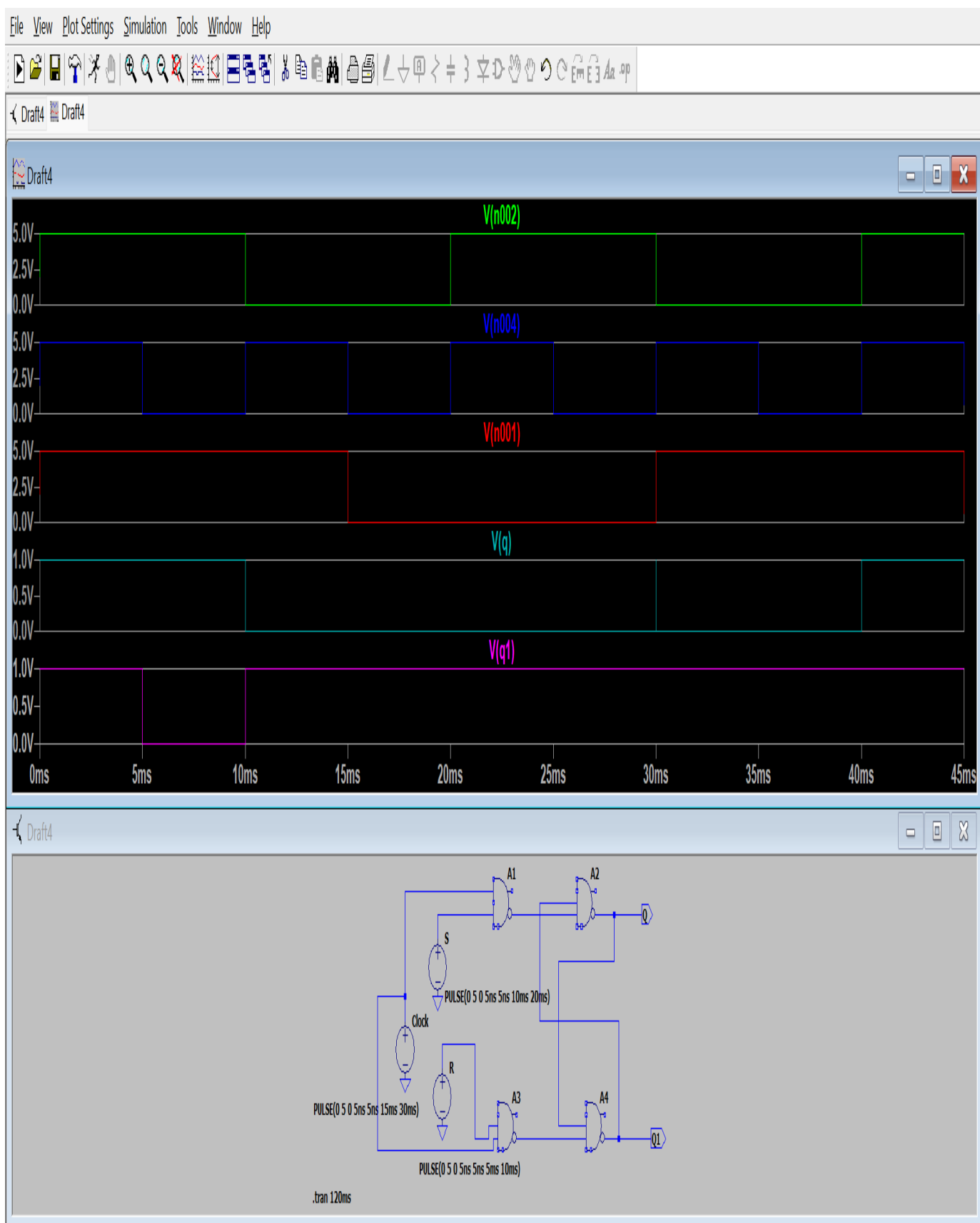
The D-type flip-flop is a modified Set-Reset flip-flop with the addition of an inverter to prevent the S and R inputs from being at the same logic level. The **D Flip Flop** is by far the most important of all the clocked flip-flops. By adding an inverter (NOT gate) between the Set and Reset inputs, the S and R inputs become complements of each other ensuring that the two inputs S and R are never equal (0 or 1) to each other at the same time allowing us to control the toggle action of the flip-flop using one single D (Data) input.

Truth Table for D type flip flop-

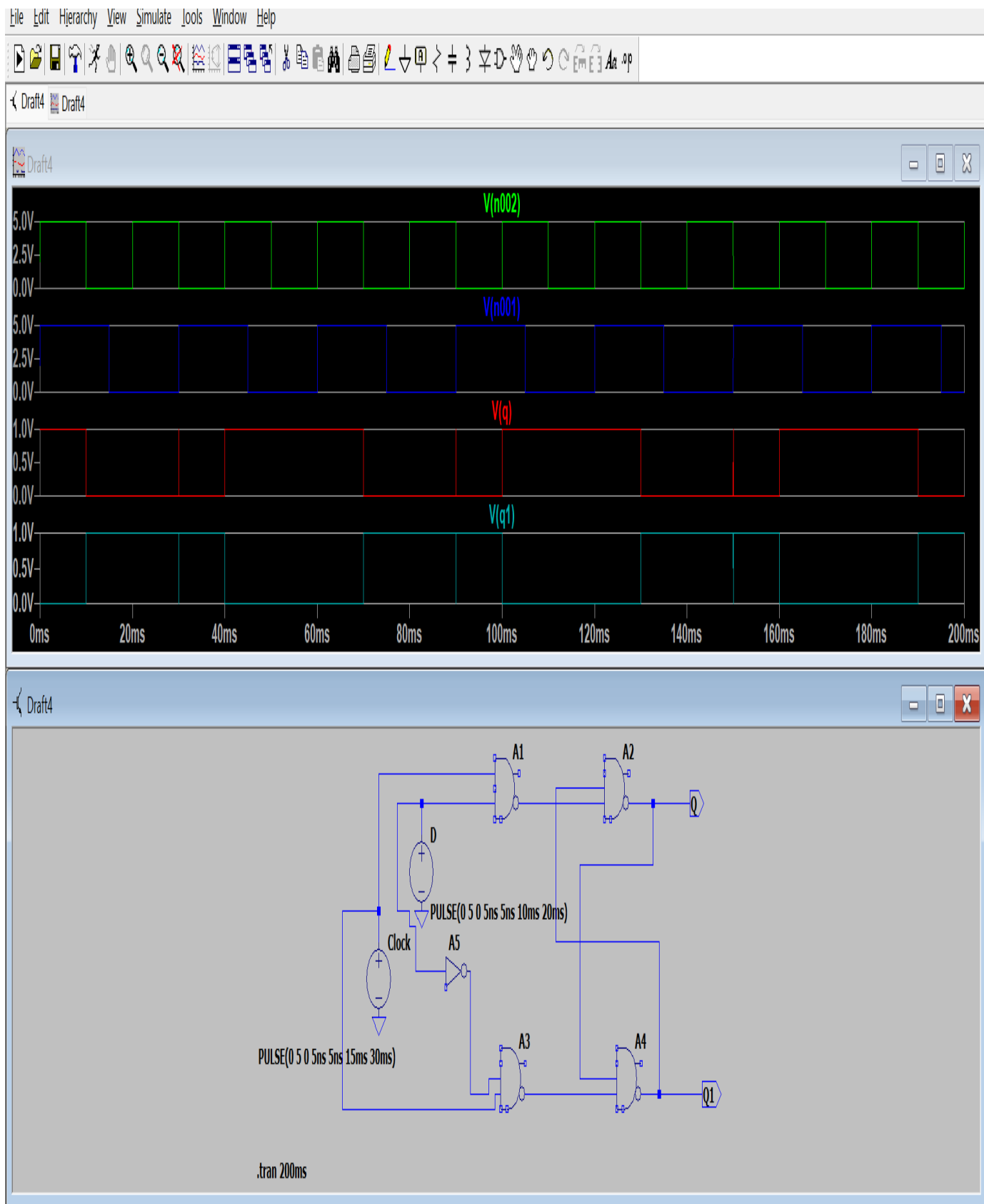
Clk	D	Q		Description
↓ » 0	X	Q	\overline{Q}	Memory no change
↑ » 1	0	0	1	Reset Q » 0
↑ » 1	1	1	0	Set Q » 1

OBSERVATION-

a)- S-R type flip flop



b)- D type flip flop-



RESULT-

S-R type flip flop and D type flip flop both are verified by the truth table.

PRECAUTION-

- All connections should be neat and clean
- Voltage should be off while connecting
- Never touch live wire

APPLICATIONS OF FLIP FLOPS-

Flip flops will find their use in many of the fields in digital electronics. Flip flops are the main components of sequential circuits. Some of the most common applications of flip – flops are Counters, Registers, Frequency ,Divider circuits and Data transfer. All these applications make use of the flip – flop's clocked operation.

Hardware debouncing technique uses an S-R latch to avoid bounces in the circuit along with the pull up resistors. S-R circuit is most effective of all debouncing approaches

A synchronous D flip-flops used as data synchronizers. The main use of a D flip flop is as a Frequency Divider. If the Q output on a D flip-flop is connected directly to the D input giving the device closed loop “feedback”, successive clock pulses will make the bistable “toggle” once every two clock cycles.