Course Name:	**Digital Design Laboratory**	**Semester:**	**III**
Date of Performance:	**30/10 / 2025**	**Batch No:**	**B2**
Faculty Name:		**Roll No:**	**16010124107**
Faculty Sign & Date:		**Grade/Marks:**	**___/25**

Experiment No: 6
Title: Shift Register

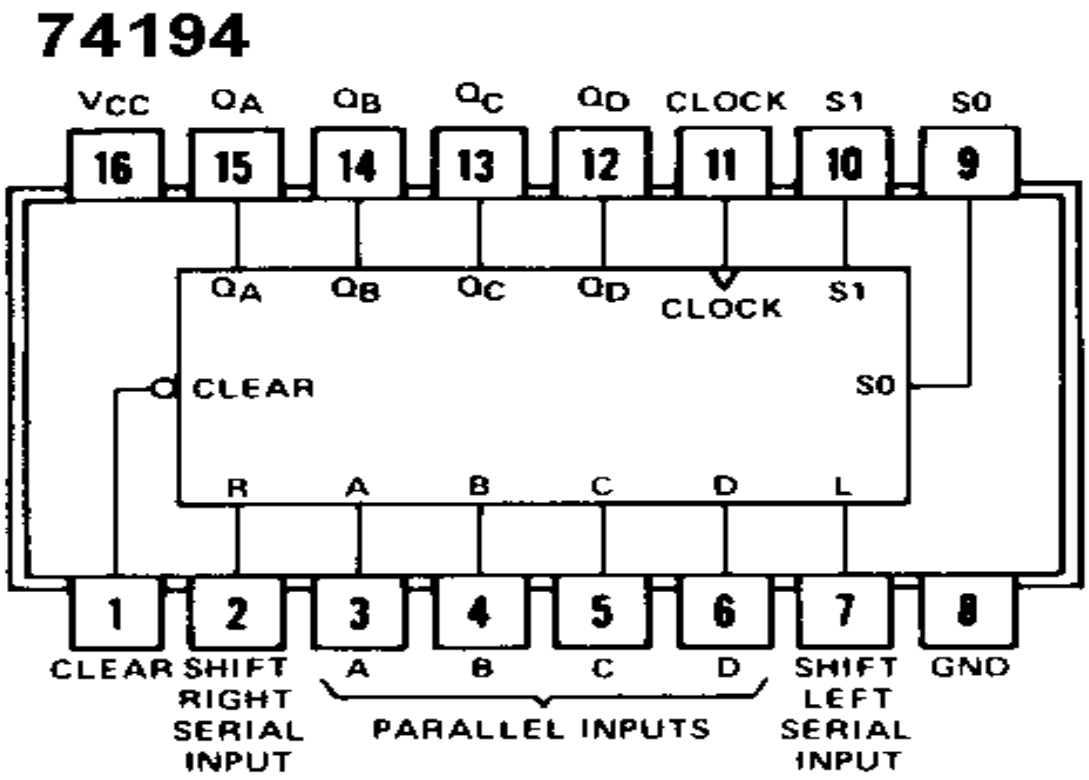
Aim and Objective of the Experiment:
To implement the SISO, SIPO, PISO, PIPO shift register using **Universal IC 74194**

COs to be achieved:
CO3: Design synchronous and asynchronous sequential circuits.

Tools used:
Trainer kits

Theory:
A register is capable of shifting its binary information in one or both directions is known as shift register. The logical configuration of shift register consist of a D-Flip flop cascaded with output of one flip flop connected to input of next flip flop. All flip flops receive common clock pulses which causes the shift in the output of the flip flop.The simplest possible shift register is one that uses only flip flop. The output of a given flip flop is connected to the input of next flip flop of the register. Each clock pulse shifts the content of register one bit position to right. The basic types of shift registers are • Serial In - Serial Out • Serial In - Parallel Out • Parallel In - Serial Out • Parallel In - Parallel Out • Bidirectional shift registers.

Pin diagram of IC 74194 and Function table



Circuit diagram: Serial left shift

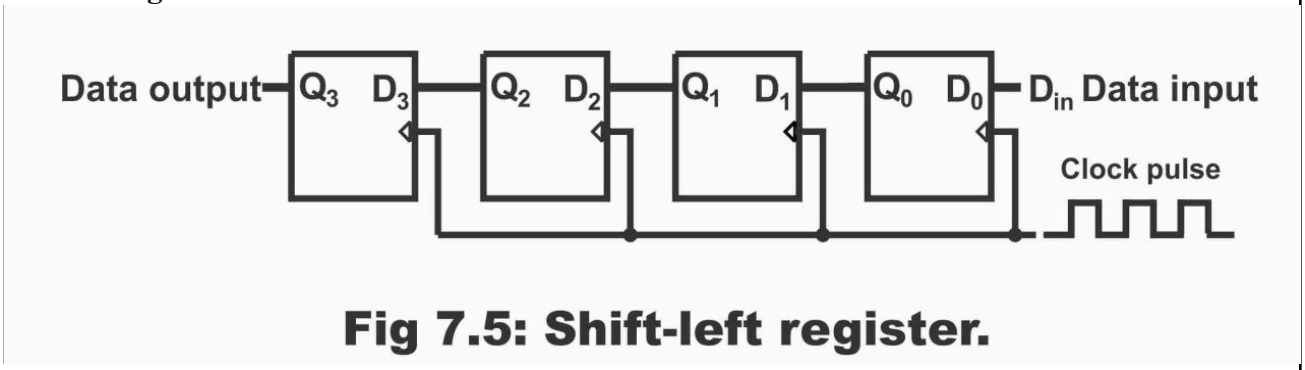


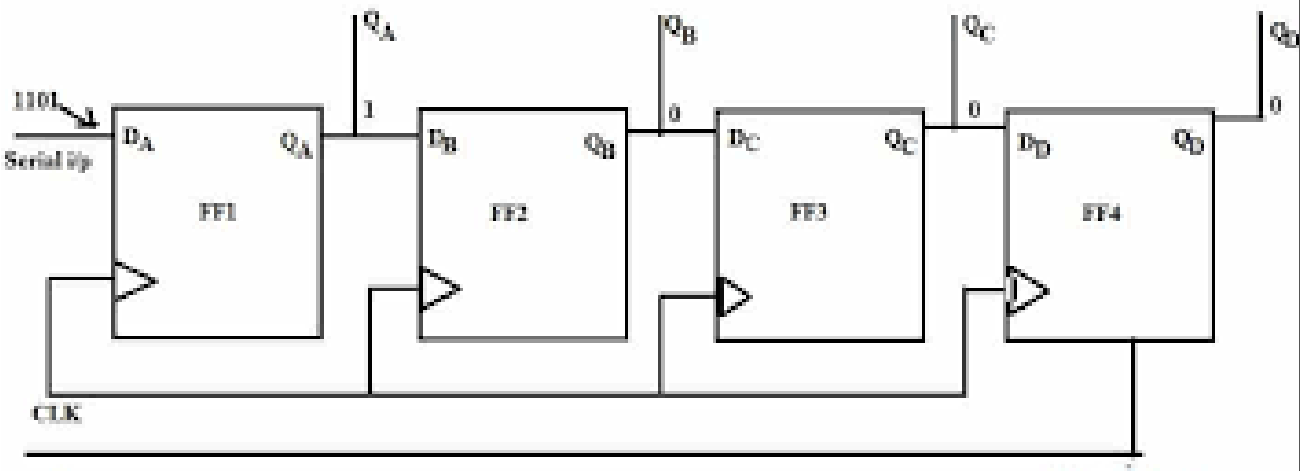
Fig 7.5: Shift-left register.

Truth Table

CP	Q_3	Q_2	Q_1	Q_0	D_{in}
Initially	0	0	0	0	1
↓ 1st	0	0	0	1	1
↓ 2nd	0	0	1	1	1
↓ 3rd	0	1	1	1	1
↓ 4th	1	1	1	1	1

Table 4.3.1 Shift left operation

Circuit diagram: Serial right shift

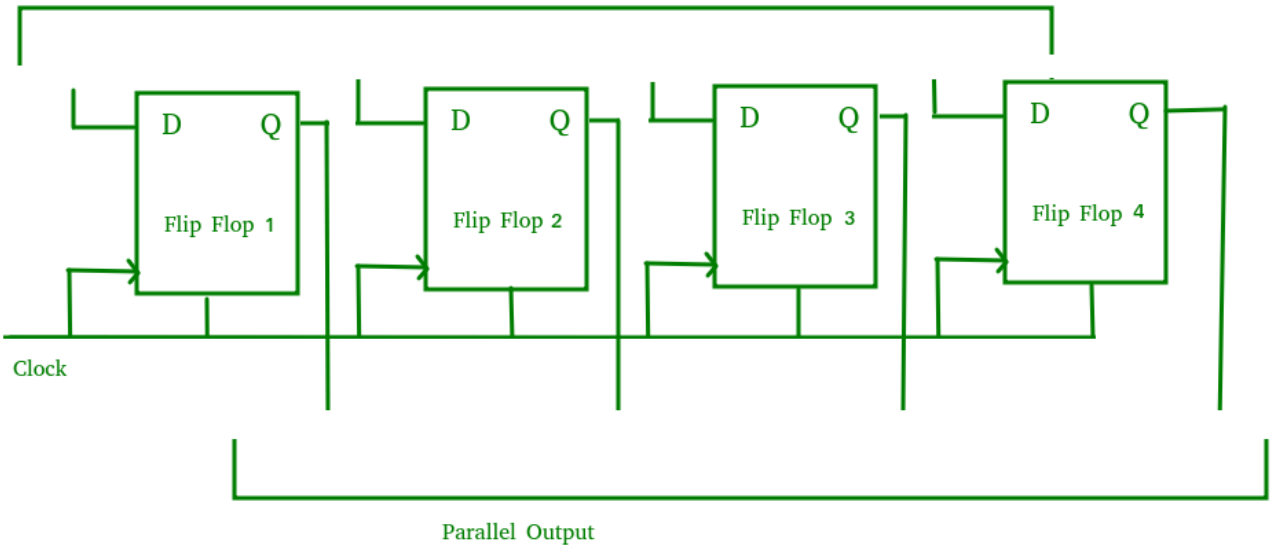


Truth Table

Operation of the Shift-right Register

Timing pulse	Q_A	Q_B	Q_C	Q_D	*Serial output at* Q_D
Initial value	0	0	0	0	0
After 1st clock pulse	1	0	0	0	0
After 2nd clock pulse	1	1	0	0	0
After 3rd clock pulse	0	1	1	0	0
After 4th clock pulse	1	0	1	1	1

Circuit diagram: Parallel in Parallel out



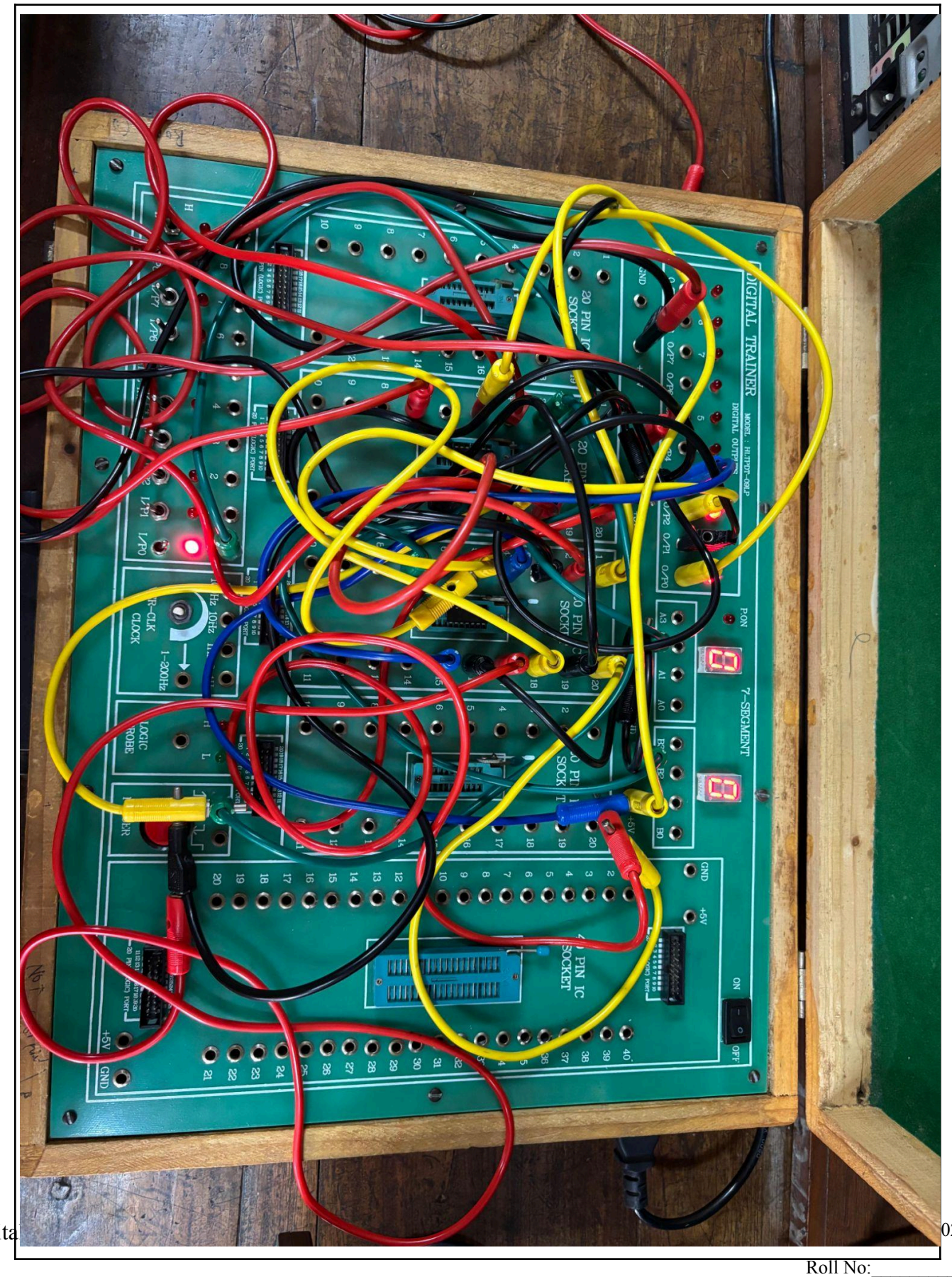
Truth Table

CLK Pulse	QA	QB	QC	QD
0	0	0	0	0
1	1	1	0	1

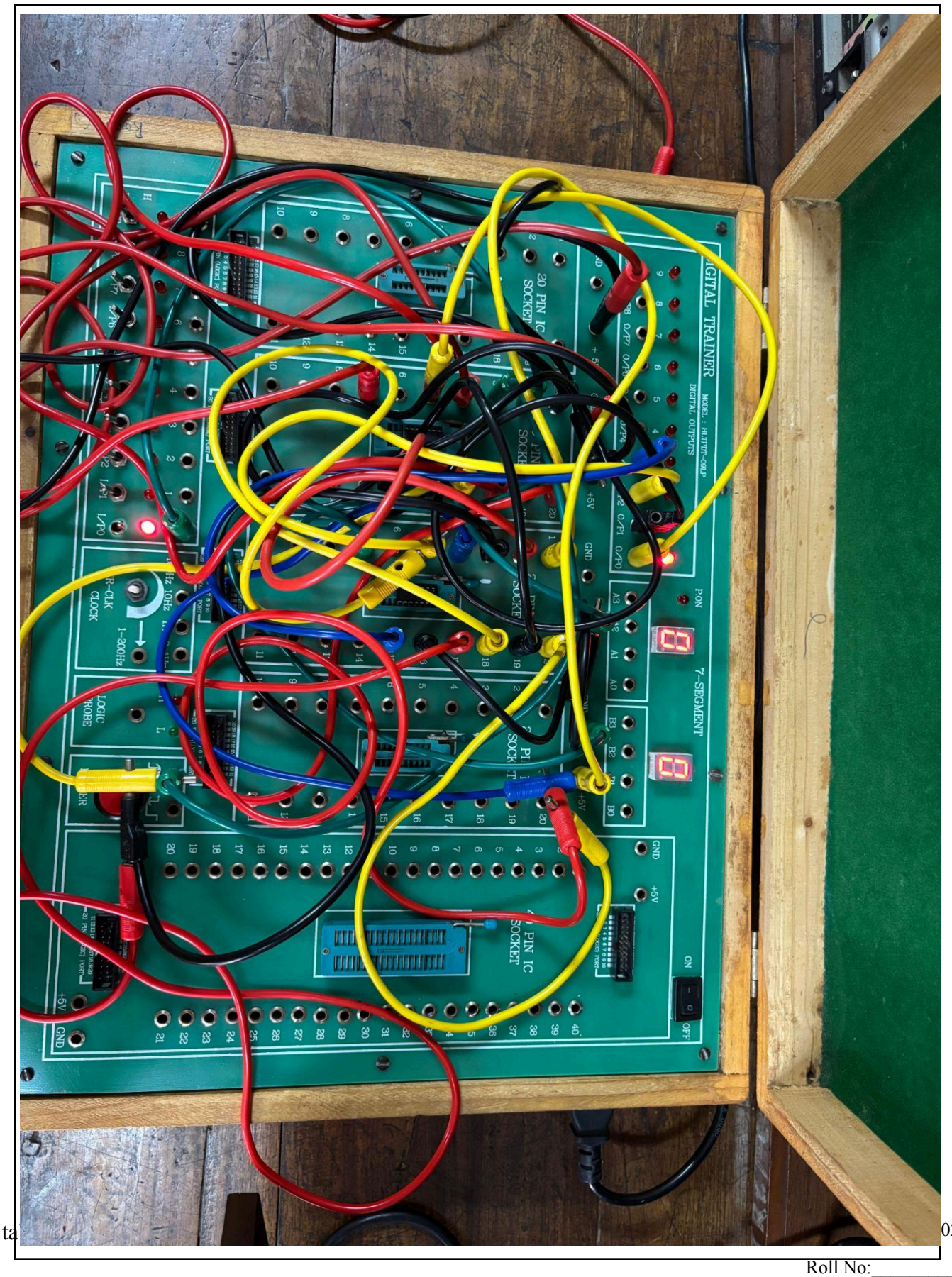
Implementation Details

Procedure

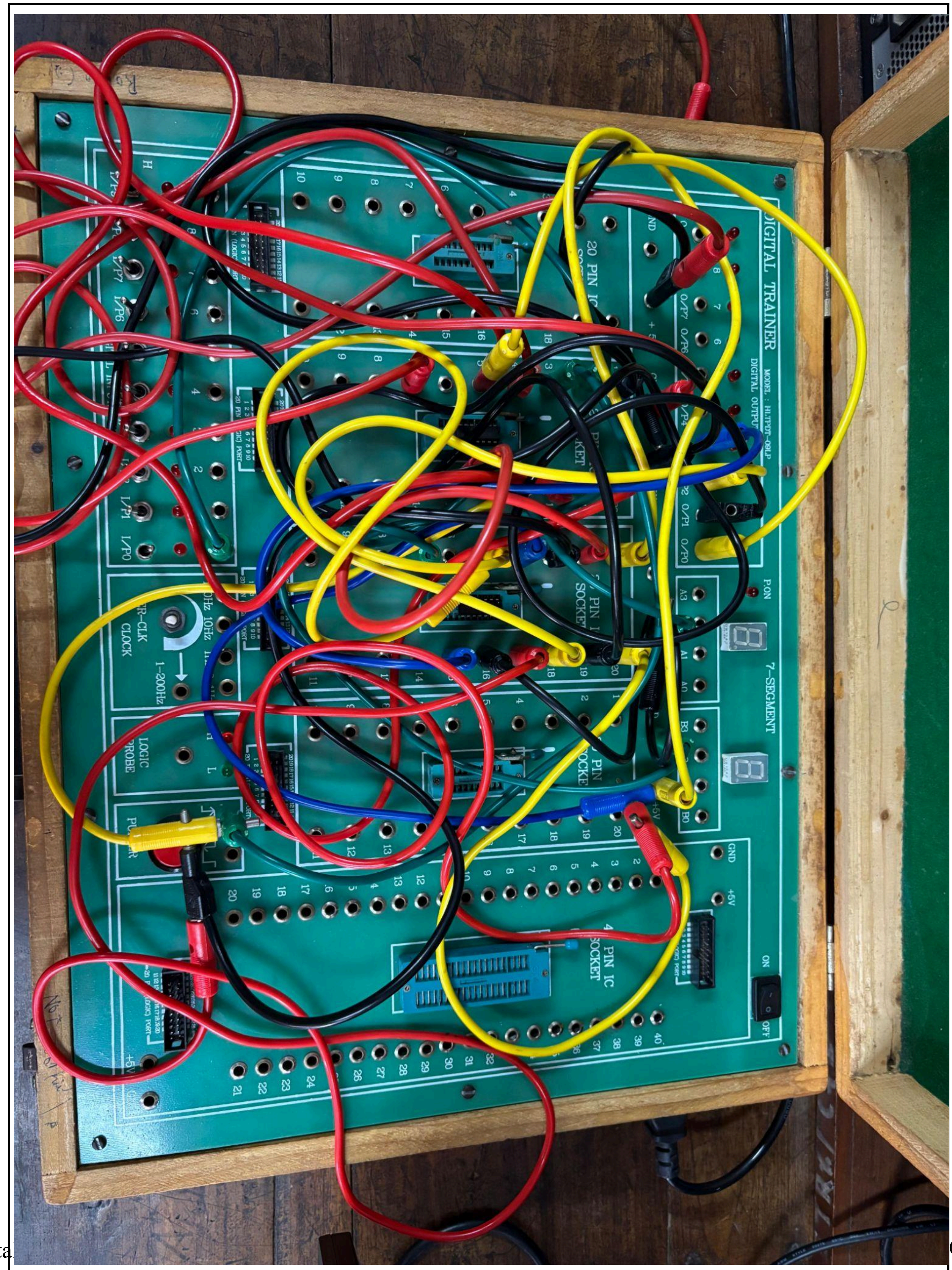
1) Locate IC 74194 on Digital trainer kit
2) Apply various inputs to appropriate pins as per the mode of operation with reference to the pin configuration of the IC.
3) Connect a pulsar switch to the clock input.
4) Verify the respective truth tables for different modes with reference to the truth table given in the data sheet of IC 74194.


DIGITAL TRAINER
MODEL : DIGITAL OUTPUTS
7-SEGMENT
20 PIN IC SOCKET
40 PIN IC SOCKET
LOGIC PROBE
CLOCK
1-200Hz
10Hz
GND
+5V
ON
OFF

Roll No:_____


DIGITAL TRAINER
MODEL : BLTPDT-09LP
DIGITAL OUTPUTS
7-SEGMENT
20 PIN IC SOCKET
40 PIN IC SOCKET
LOGIC PROBE
CLOCK
1-200Hz
ON
OFF
GND
+5V

Roll No:_____


DIGITAL TRAINER
7-SEGMENT
LOGIC PROBE

Post Lab Subjective/Objective type Questions:

1. What is a universal shift register?

A universal shift register is a versatile register that can perform both right and left shifts, as well as parallel loading and holding of data. It combines the capabilities of both bidirectional and unidirectional shift registers with a parallel load feature by using multiplexers and flip-flops. By using selection inputs, it can be configured to operate in various modes, including serial-in/serial-out, serial-in/parallel-out, parallel-in/serial-out, and parallel-in/parallel-out

2. Prepare a truth table for 3 bit SISO left shift with data 011 along with clock pulse

Clock Pulse	Serial Input	Q_2	Q_1	Q_0
0	-	0	0	0
1	0	1	0	0
2	1	0	1	0
3	1	0	0	1
4	0	1	0	0
5	1	0	1	0

3. Can a shift register be used as a counter? Give any one application.

Yes, a shift register can be used as a counter by connecting the output of the last stage back to the input of the first stage.

Ring Counter: The output of the last flip-flop is connected to the input of the first flip-flop. A single high bit circulates through the register, creating a sequence of unique outputs before repeating. An n-bit ring counter is a mod-n counter.

4. How many clock pulses are required to enter a byte of data serially into an 8-bit shift register?

Eight clock pulses are required to enter a byte of data serially into an 8-bit shift register, as each pulse shifts one bit into the register one bit at a time.

Conclusion:

Shift registers are sequential logic circuits that use flip-flops to store and shift binary data, enabling crucial functions like data conversion, temporary storage, and delay generation. Their importance in

digital electronics lies in their ability to manage data flow, synchronize with clock signals, and control timing, making them fundamental in devices ranging from simple indicators to complex computer systems

Signature of faculty in-charge with Date: