

Course Name:	Digital Design Laboratory	Semester:	III
Date of Performance:	25/ 09 /2023	Batch No:	C2
Faculty Name:	Mrs. Jyoti M Varavadekar	Roll No:	16010122267
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

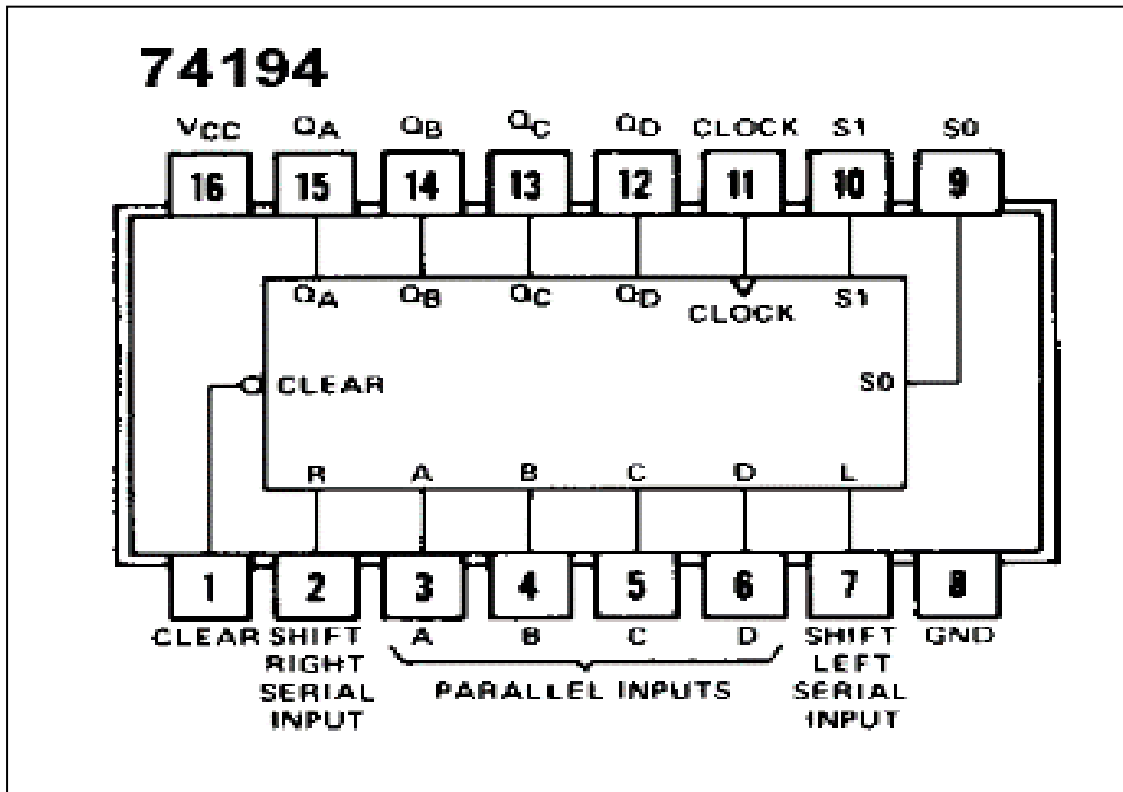
Theory:

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.

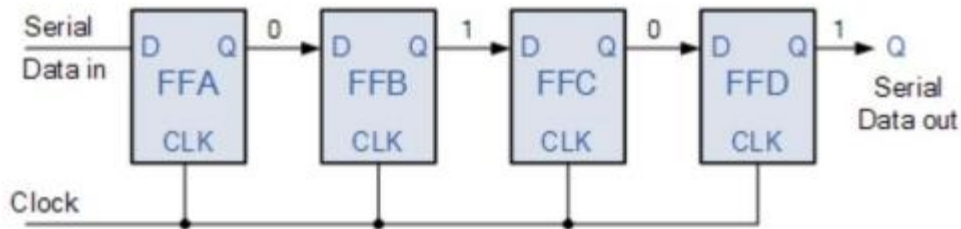
Pin diagram of IC 74194 and Function table



Function Table:

Inputs										Outputs			
Clear	Mode		Clock	Serial		Parallel				QA	QB	QC	QD
	S1	S0		Left	Right	A	B	C	D				
L	X	X	X	X	X	X	X	X	X	L	L	L	L
H	X	X	↓	X	X	X	X	X	X	QA0	QB0	QC0	QD0
H	H	H	↑	X	X	a	b	c	d	a	b	c	d
H	L	H	↑	X	H	X	X	X	X	H	QAn	QBn	QCn
H	L	H	↑	X	L	X	X	X	X	L	QAn	QBn	QCn
H	H	L	↑	H	X	X	X	X	X	QBn	QBn	QCn	H
H	H	L	↑	L	X	X	X	X	X	QBn	QBn	QCn	L
H	L	L	X	X	X	X	X	X	X	QA0	QB0	QC0	QD0

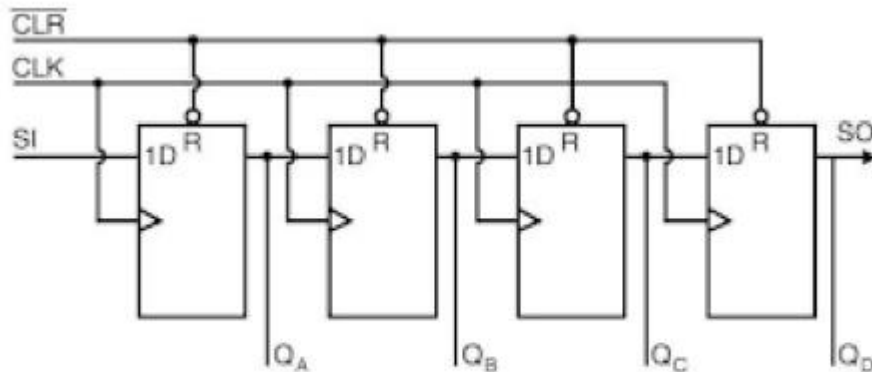
Circuit diagram: Serial In Serial Out



Truth Table

clk	A	B	C	D
0	1	0	0	1
1	1	1	0	0
2	0	1	1	0
3	0	0	1	1

Circuit diagram: Serial In – Parallel Out

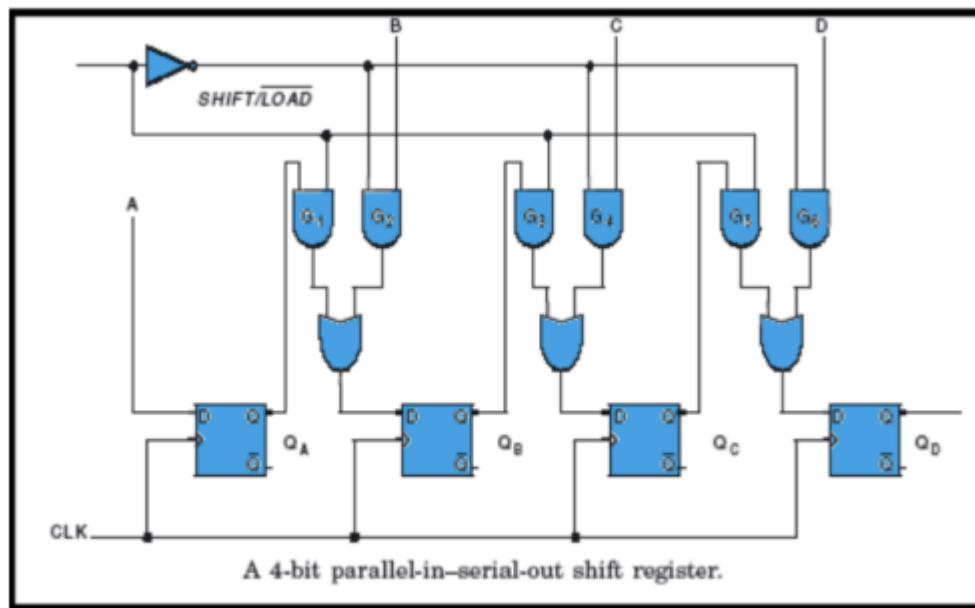


Serial-in/ Parallel-out shift register details

Truth Table:

clk	A	B	C	D
0	1	0	0	1
1	1	1	0	0
2	0	1	1	0
3	0	0	1	1

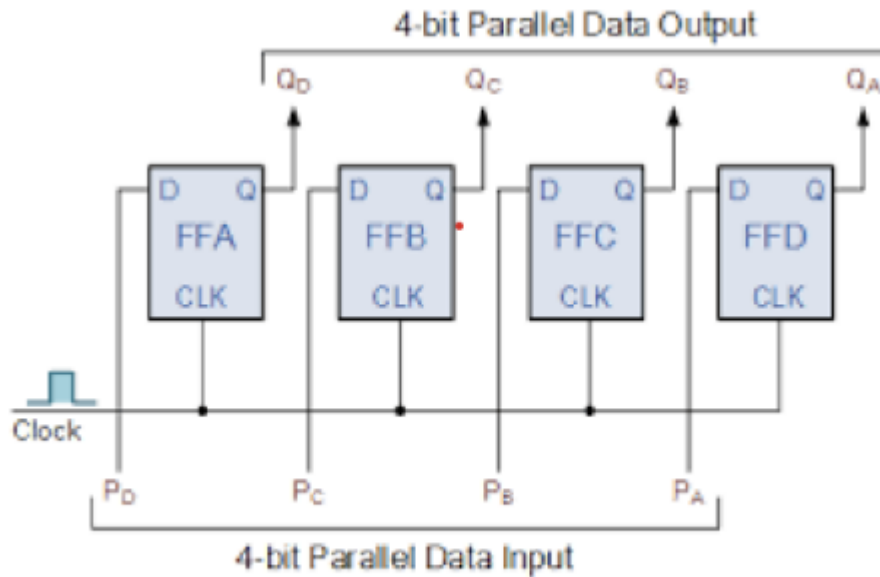
Circuit diagram: Parallel in Serial out



Truth Table:

CLK	A	B	C	D
0	0	0	0	1
1	0	0	0	0
2	1	0	0	0
3	1	1	0	0
4	1	1	1	0
5	1	1	1	1
6	0	1	1	1
7	0	0	1	1

Circuit diagram: Parallel In Parallel Out



Truth table:

CLK	A	B	C	D
0	0	0	0	1
1	0	0	0	0
2	1	0	0	0
3	1	1	0	0
4	1	1	1	0
5	1	1	1	1
6	0	1	1	1
7	0	0	1	1

Implementation Details

Procedure

- 1) Locate IC 74196 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.

Post Lab Subjective/Objective type Questions:

1. What is a universal shift register?

Ans:

A Universal shift register is a register which has both the right shift and left shift with parallel load capabilities. Universal shift registers are used as memory elements in computers. A Unidirectional shift register is capable of shifting in only one direction.

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

Ans:

Clock	Data In	Shifted Data Out
1	- - -	- - -
2	- - -	- - -
3	- - -	- - -
...

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

Ans:

Yes, a shift register can be used as a counter in some applications. A shift register is a sequential digital circuit that can be used to store and manipulate data. When configured properly, it can be used to count events or pulses.

One common application of using a shift register as a counter is in electronic display systems, such as LED displays.



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

Ans:

To enter a byte of data serially into an 8-bit shift register, you would need 8 clock pulses. Each clock pulse would shift one bit of data into the shift register. Here's how it works:

1. Initially, all bits in the 8-bit shift register are set to some default value (usually 0 or 1).
2. You start sending your serial data, bit by bit, to the input of the shift register.
3. For each clock pulse, the data at the input gets shifted into the first bit of the shift register, and the existing bits shift one position to the right.
4. You repeat this process for each of the 8 bits in your byte of data.

So, for each bit of data in the byte, you need one clock pulse to shift it into the shift register.

Since there are 8 bits in a byte, you would require 8 clock pulses to serially enter the entire byte of data into the 8-bit shift register.

Conclusion:

In our experimentation with the 74194 universal shift register, we demonstrated its versatile capability to execute various types of shifting operations with high efficiency. This adaptability renders it valuable for a wide range of applications that require the processing of data in both serial and parallel formats.

Signature of faculty in-charge with Date: