

Design a shift register (shift left and shift right) using flip-flops. Study the functional characteristics of IC 74LS194.

Objective:

To study and construct a shift register which can be shifted left and shifted right using flip-flops and other necessary components and also study the functional characteristics of 74LS194.

Theory:

To construct a shift register we require 4 D flip-flops and 4-to-1 multiplexers.

The shift register has been shown in the figure (2).

It consists of four D flip-flops, although RS flip-flops could be used provided an inverter is inserted between S & R.

The four multiplexers are part of the register.

The four (MUX) has common selection variables S_1 and S_0 .

The S_1 & S_0 are control pins, and the functional characteristic of the shift register has been shown in the ~~figure~~ table (1).

The D flip-flops used are positive edge triggered.

The positive edge triggered flip-flops work on the positive going transition.

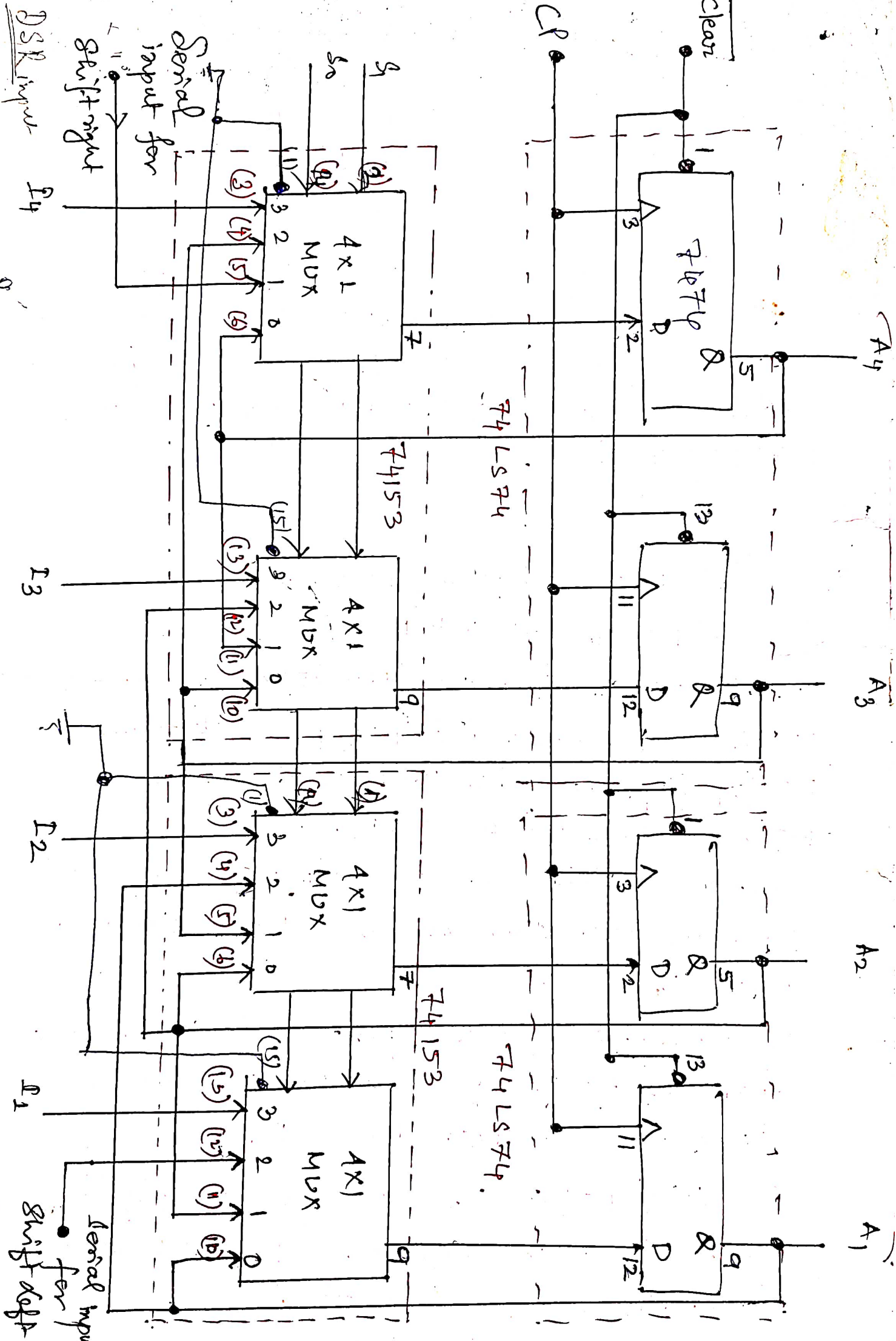


Table 1. Functional table for the register of figure (1).

Mode Control		Register operation.
S_1	S_0	
0	0	no change shift right shift left parallel load.
0	1	
1	0	
1	1	

Apparatus required:

(a) Bread board

(b) Jumpers

(c) Voltmeters Range: 0 - 20 volts (dc)

(d) Regulated power supply, voltage = +5 volts (dc)
max current = 500 mASemiconductors used.

(a) 74LS74, Dual 0 type flip-flop

(b) 74LS153 Dual 4 to 1 Multiplexer

DSLimp
DSR Input

Select

DL	DSR	L ₄	L ₃	L ₂	L ₁	S ₁	S ₀	A ₄	A ₃	A ₂	A ₁
		X	X	X	X	0	0	← N.C. →			
X	L	X	X	X	X	0	1	← Left Right shift →			



CLK	DSR	DSL	L ₄	L ₃	L ₂	L ₁	S ₁	S ₀	A ₄	A ₃	A ₂	A ₁
X L	X	X	X	X	X	X	X	X	← N.C. →			
↑	X	X	X	X	X	X	0	0	← N.C. →			
↑	H	X	X	X	X	X	0	1	1	0	0	0
↑	H	X	X	X	X	X	0	1	1	1	0	0
↑	H	X	X	X	X	X	0	1	1	1	1	0
↑	H	X	X	X	X	X	0	1	1	1	1	1
↑	X	L	X	X	X	X	1	0	1	1	1	0
↑	X	L	X	X	X	X	1	0	1	1	0	0
↑	X	L	X	X	X	X	1	0	1	0	0	0
↑	X	L	X	X	X	X	1	0	0	0	0	0
↑	X	L	X	X	X	X	1	0	0	0	0	0
↑	X	X	L	H	H	L	1	1	1	H	H	L
↑	X	X	H	L	L	H	1	1	1	L	L	H