

Answer the Question no: 01

(1)

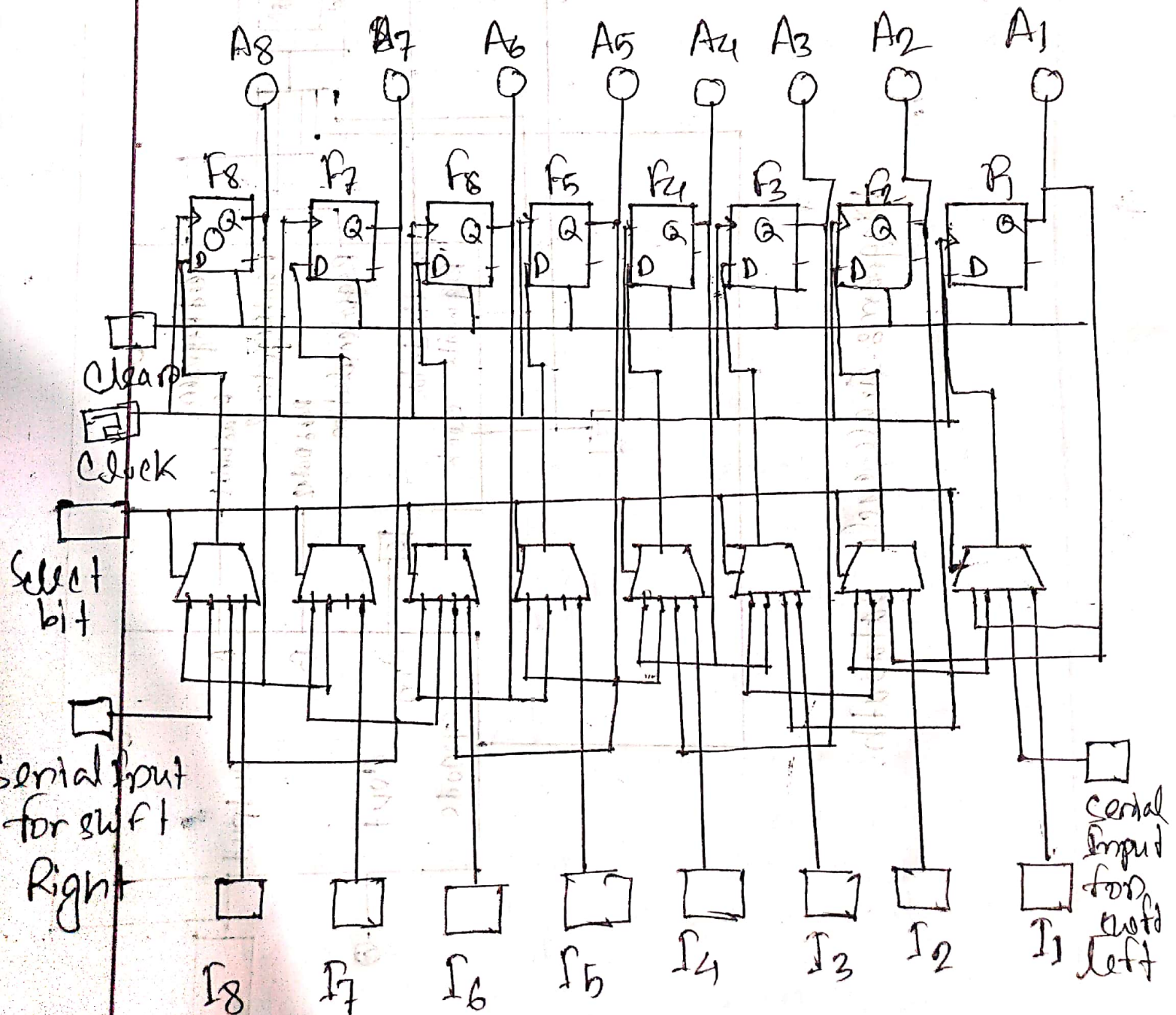


Diagram: 8-bit shift-left and Right Register





## Answer the question: 03

The differences between sequential and combinational circuit is discussed below.

combinational circuit	sequential circuit
1. In combinational circuit the output depends on the present input. We can call the output as independent because of giving output based on the current input on the device.	2. In sequential circuit the output of the circuit not only depends on the current input but also depends on the previous output.
2. As the current instant is required it is faster and better.	2. In this case, <del>the</del> <sup>the circuit</sup> have take account on the previous inputs and output in consideration. So slower than combinational.
3. It has no capability to store any data state.	3. It has the capacity to store the state.

4. Combination circuit don't have any clock.

4. Sequential circuit has clock and they need triggering.

5. Example:  
Decoder, Encoder,  
Multiplexer.

5. Example:  $\rightarrow$   
Flip Flops, Counters.

Answer the question no: 04

Design 8:1 multiplexer using 4:1 and 2:1 multiplexers. At first we need to draw the truth table of the mux.

for 8:1 mux,

$S_2$	$S_1$	$S_0$	$y$
0	0	0	$f_0$
0	0	1	$f_1$
0	1	0	$f_2$
0	1	1	$f_3$

$2:1 \rightarrow$   $4:1$



1	0	0	$I_4$
1	0	1	$I_5$
1	1	0	$I_6$
1	1	1	$I_7$

→ 481.

We have need two 4:1 mux and one 2:1 mux for building 8:1 mux.

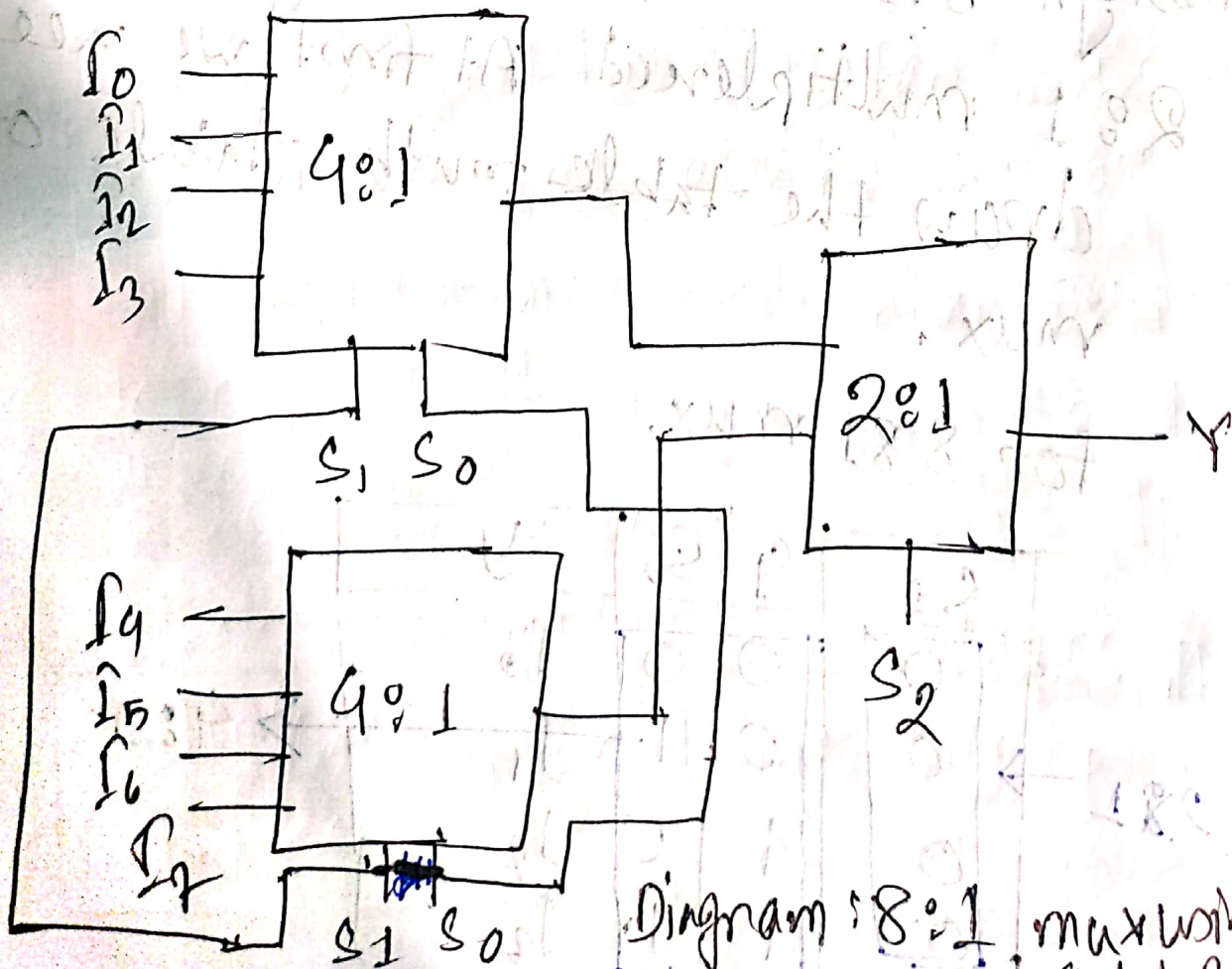


Diagram: 8:1 mux using 4:1 & 2:1

If we don't circuit the  $S_1$  &  $S_2$  for two mux 4:1 then both them works for 00, 01, 10, 11. If we select 00 then  $I_0$  and  $I_4$  will be selected then we select the  $S_2 = 0$  then the  $I_0$  will show as output and  $S_2 = 1$  then the  $I_4$  will be shown as output.

Answer the question no: 05

At the time of designing a register file with multiple registers, we use multiplexers to read data from specific register using the selection bit of the multiplexer. But, there need to store some data to the registers, so need a component to add data to specific register. It



Can be done using De-Multiplexers, where it has a input signal with  $n$  selection lines and maximum of  $2^n$  outputs.

But we didn't use de-multiplexers because the ~~de-m~~ multiplexer has the feature ~~ability~~ to send data to specific line with the other lines make zero.

If you send data through MUX, it will send the output to the specific register but make all the register value to zero.

When someone selects the selection bit the MUX will send data ~~tho~~ through I<sub>0</sub> or I<sub>2</sub> or anything but also send data zero to other registers and replace the previously store values.

De-multiplexer has not the ability to control registers separately. So, we

we decoder instead of De-multiplexer.

Answer the question no: 06

In our designed registerfile, we can read one data at a time which is used for developing single cycle datapath.

If we want to write two data a time then we need pipelining:

Where multiple process can execute

at a time. This register <sup>file</sup> is ~~not~~ based

on multiple temporary registers where

multiple data can be stored in the

same time. This register file is



used in designing multicycle datapath.  
 So, it is the best way to use multi-registers  
 or temporary registers in multi-cycle  
 datapath to store multiple data at a  
 time.

7. For id: 1620847042

Value of nth register	Before running instruction x	After running instruction x
Value of 2nd register	Before running instruction a = 6	After running instruction a = 3
Value of 5th register	Before running Inst. b = 8	After running inst. b = 4
Value of 10th register	Before running Inst. c = 1	After running Inst. c = 7
Value of 8th register	Before running Inst. d = 0	After running Inst. d = 4
Value of 8th register	Before running e = 4	After running Inst. e = 5