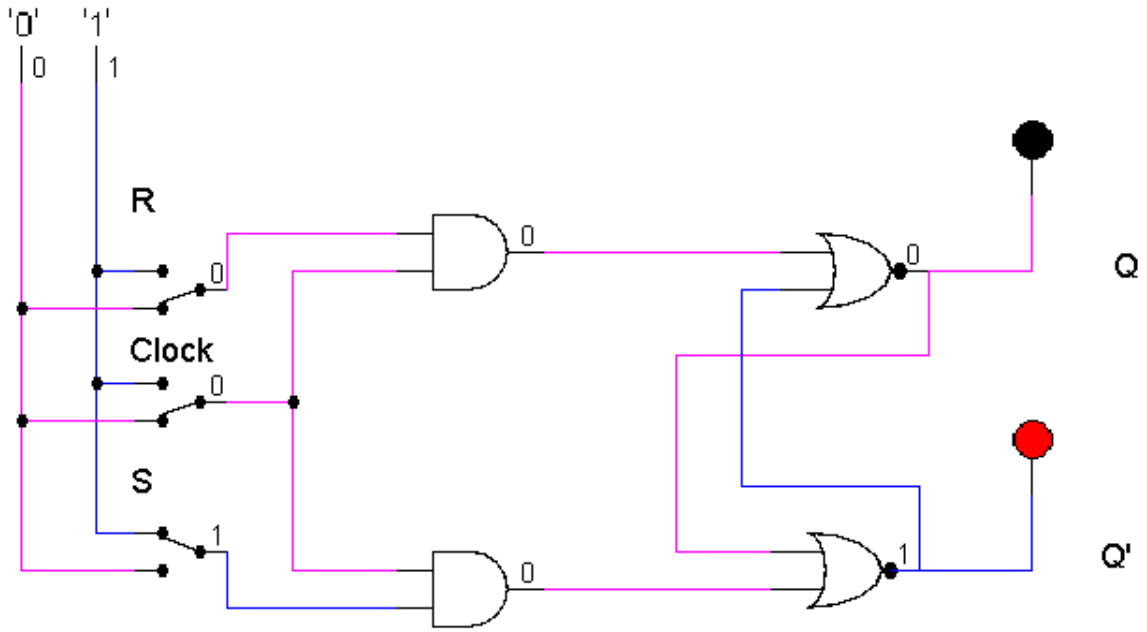
Instruction:

Complete all questions in **1 hour.**

1. What is flip flop? Describe the working mechanism RS flip flop.

Ans=A device which stores a single bit (binary digit) of data is called a flip flop.



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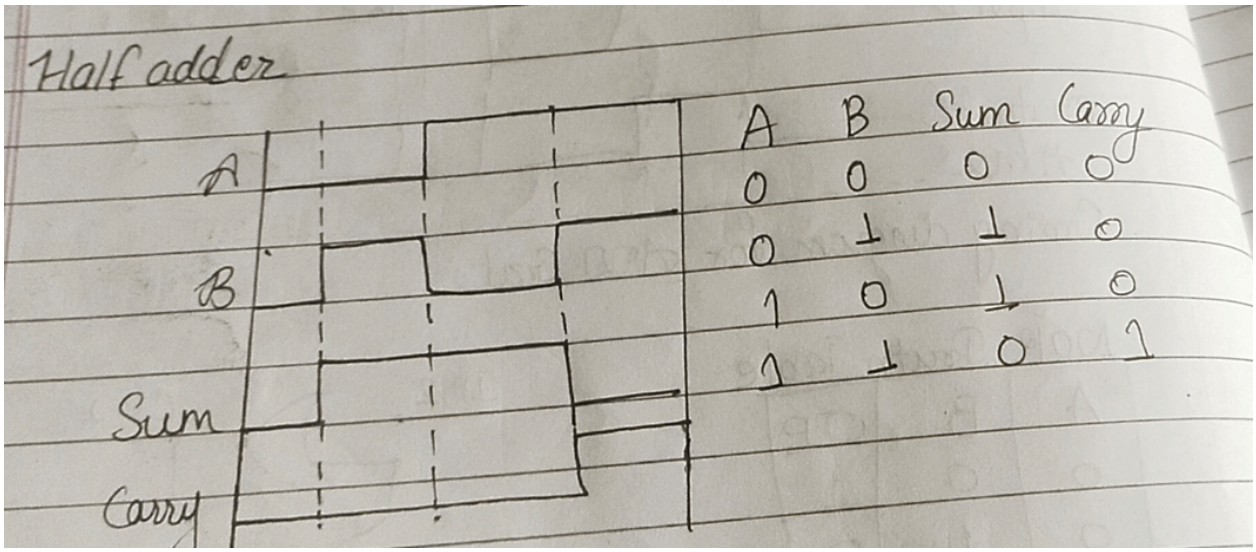
S	R	Q	Q’
0	0	Qn	Q(n+1)
0	1	0	1
1	0	1	0
1	1	X	X

=RS flip flop is equivalent to Sr latch. It has two input sets(s) and reset(r). In addition, there is a clock input too. Here, at high clock input, when set input is high i.e., 1, then Q

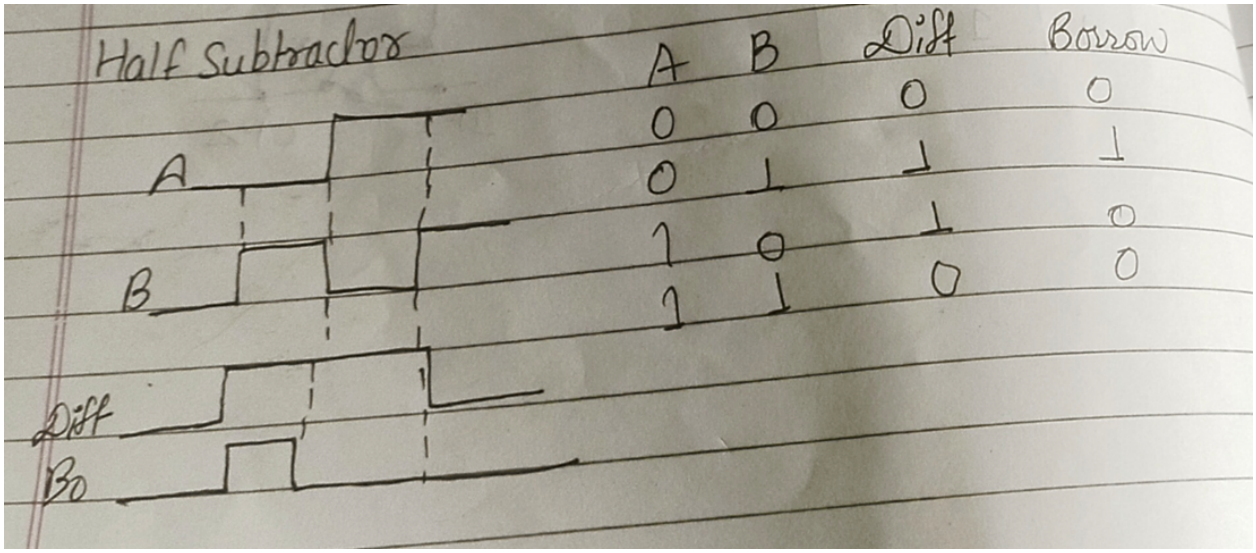
output also goes high. Similarly, Q output goes low when the reset input is high. These are the output that this circuit gives when the clock input is at high but when clock input is at low the output at Q and Q' both remains unchanged i.e., it shows the previous output.

2. Construct the timing diagram for half adder and half subtractor, full adder.

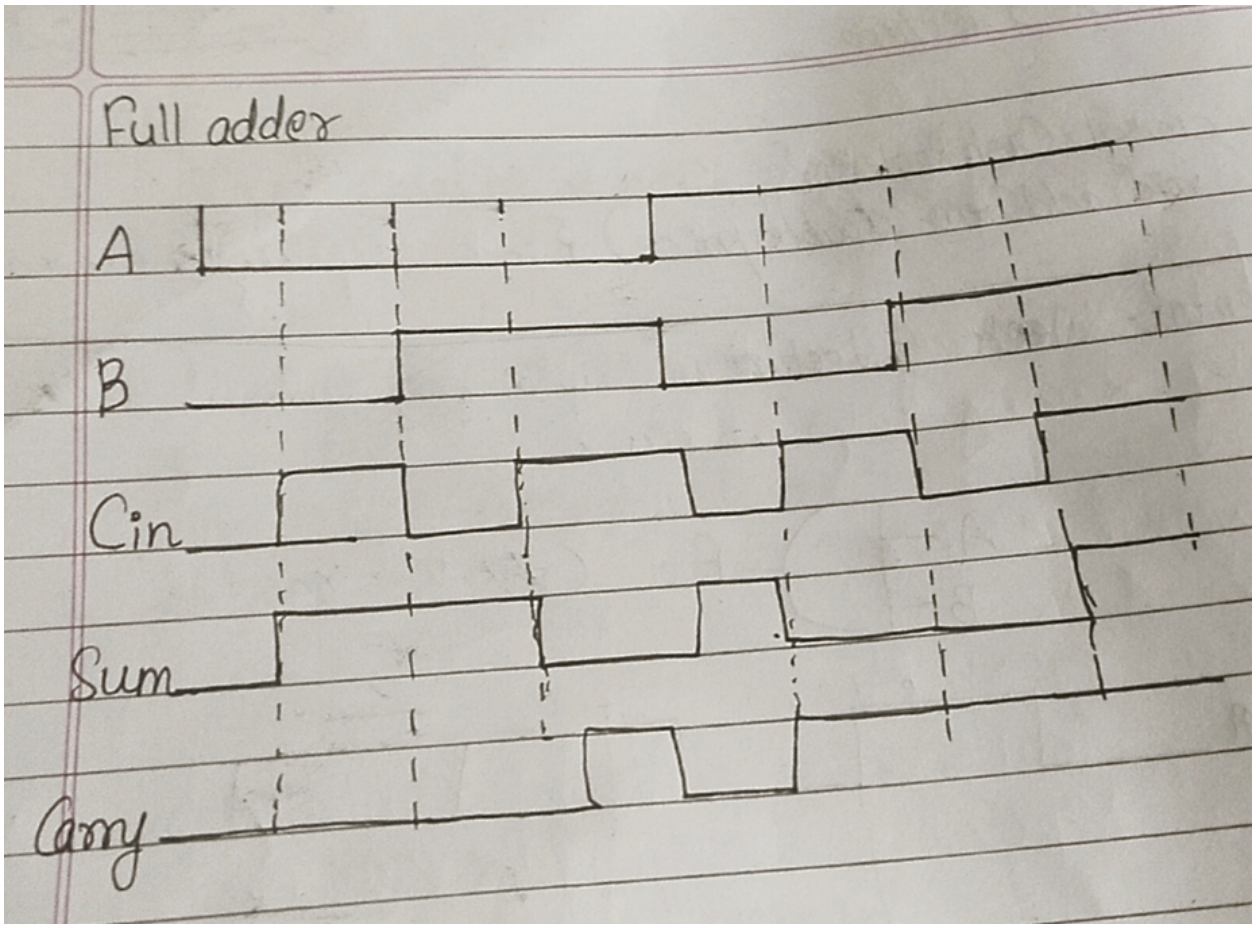
Half adder



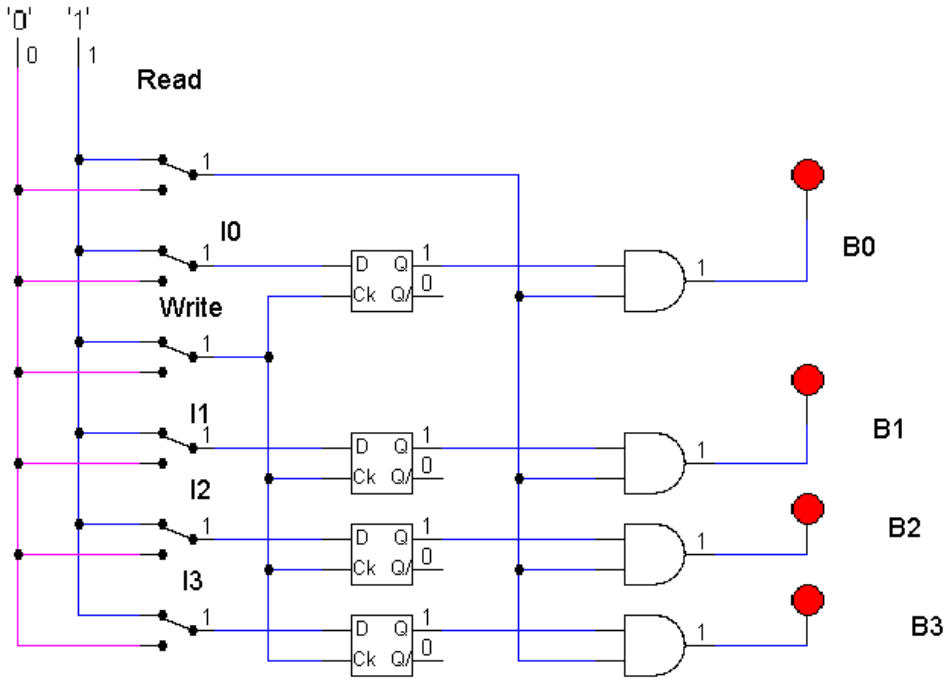
Half Subtractor



Full Adder



3. Describe the working mechanism of a 4-bit register by constructing the circuit using D flip flop.



= To store 4-bit data we require 4 flip-flops. We have a four-bit register for this purpose.
The Input I0 to I3 are transferred to the register when the Write is pulsed.
When the Read is pulsed, the register contents appear on the bus lines B0 to B3.

4. Differentiate between:
    a) Flip flop and Latch

Flip flop	Latch
Flip-flop utilizes an edge triggering approach.	Latch follows a level triggering approach.
The clock signal is present.	The clock signal is absent.
It has a slow operating speed.	It has comparatively fast operating speed.
It requires more power.	It requires comparatively less power.

b) Combinational circuit and Sequential circuit

Combinational circuit	Sequential circuit
It depends upon the present input only.	It depends upon present input as well as past input.
There is no feedback path between output and input.	There is no feedback path available between output and input.
The combinational circuits are mainly used for arithmetic and boolean expression.	The sequential circuits are used for data storing.
The operation of a combinational circuit is very simple.	The operation of a sequential circuit is very complex.

c) SIPO and PISO shift register

=A shift register is a circuit that converts serial data to parallel data.

SIPO is a shortened form for serial-in-to-parallel-out. It is a serial data register that

is loaded one bit at a time, with the stored data available in parallel at the output. PISO is a word

that stands for "Parallel-in to Serial-out." Under clock control, the parallel data is loaded into the register and serially shifted out one bit at a time.