Victoria University of Bangladesh
Dept. of CSE
Program:- B.Sc in CSIT
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Course code:- CSE 223

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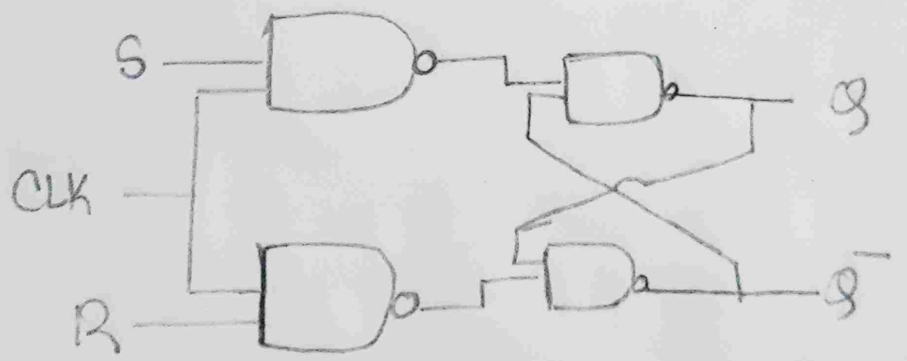
Ans to the Q no (1)

a) **Flip-flop:-** A flip flop is an electronic circuit with two stable states that can be used to store binary data. The stored data can be changed by applying varying inputs. Flip-flops are fundamental building blocks of digital electronics systems used in computers, communications and many others types of systems.

Here is a diagram of ~~flip~~ flip flop which is a synchronous Circuit and also known as a gated or clocked SR latch:-



In this circuit diagram, the output is changed (i.e. the stored data is changed) only when you give an active clock signal. Otherwise, even if the S or R is active, the data will not change.

b) Types of Sequential Circuits:-

There are two main types of sequential circuits:-

(i) Asychronous Sequential circuits:-

Asychronous circuits, which do not sychronize with the clock signal, are fasters and independent of internal clock pulse, but they have uncertainty in outputs and are challanging to design.

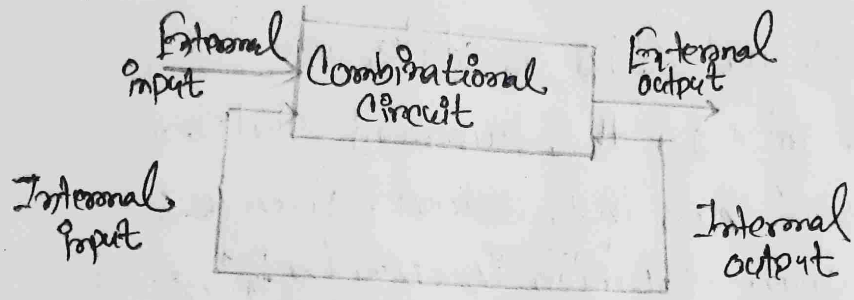


Fig:- Asychronous Sequential circuit.

(i) Sychronous Sequential circuits:-

This circuits synchronize with the positive or negative edge of the clock signal, causing outputs to change simultaneously. They use clock signal and level input are slower than asynchronous circuits and can be locked or unlocked. Level output changes state at input pulse start.

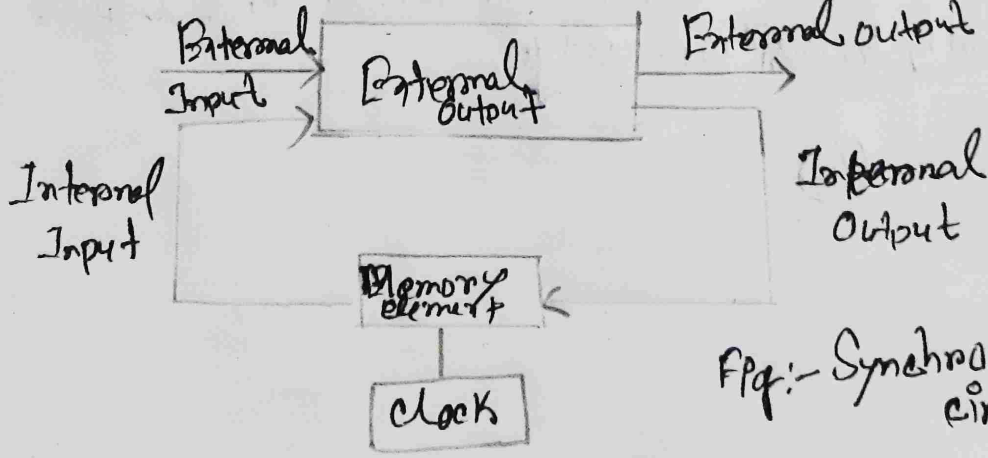


Fig:- Synchronous Sequential circuit

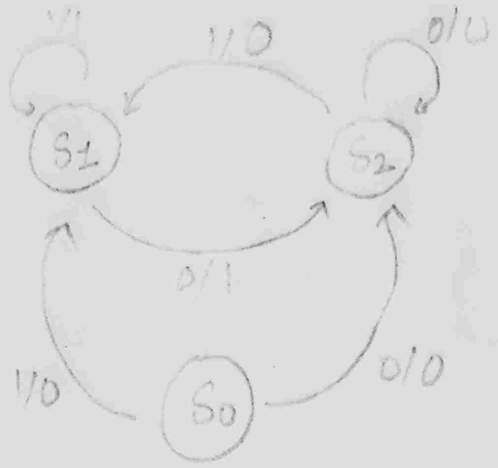
Ans to the. Q no-(3)

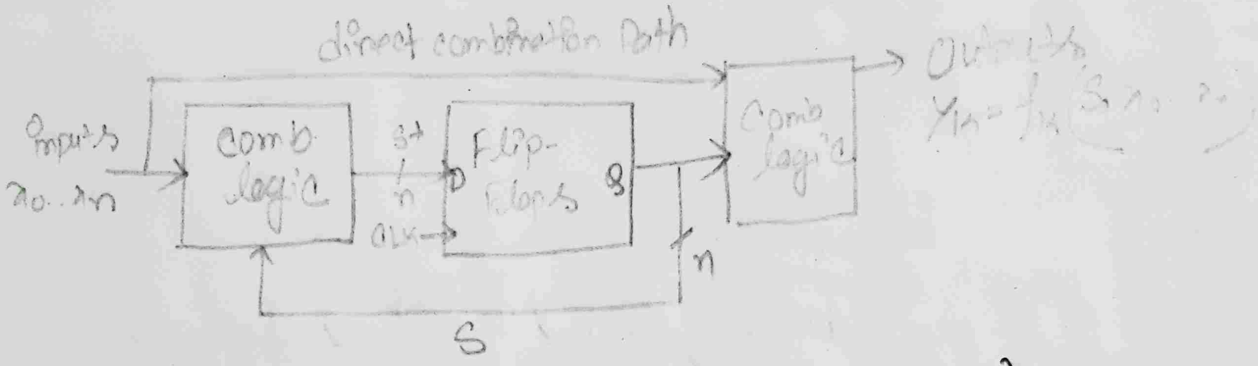
a) Mealy model:- A mealy model is a state machine where the outputs depend on both the the current state and the inputs. This means that the outputs can change as soon as the input changes, without waiting for a clock signal or a state transition.

Moore model:- A moore model is a state machine where the outputs depend only on the current state, not the inputs. This means that the outputs changes only when the state changes, which is usually triggered by a clock signal or a specific input combination.

b) Mealy state machine:-

In the theory of computation, a Mealy machine is a finite state transducer that generates an output based on its current state and input. This means that the state diagram will include both an input and output signal for each transition edge.



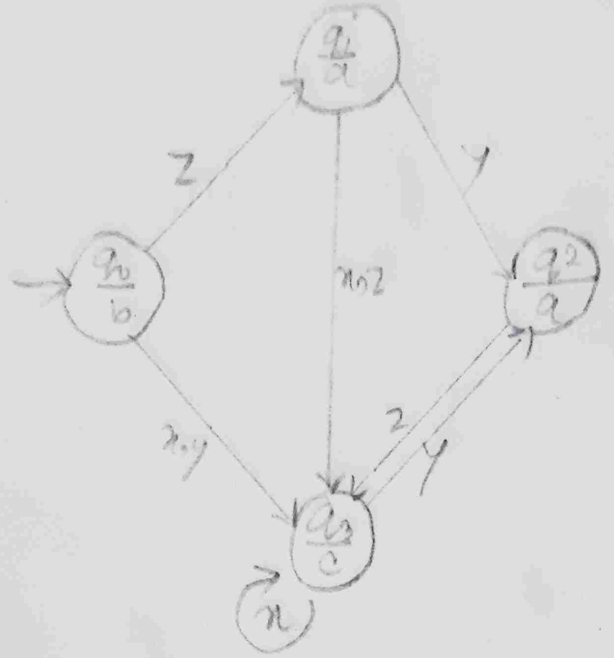


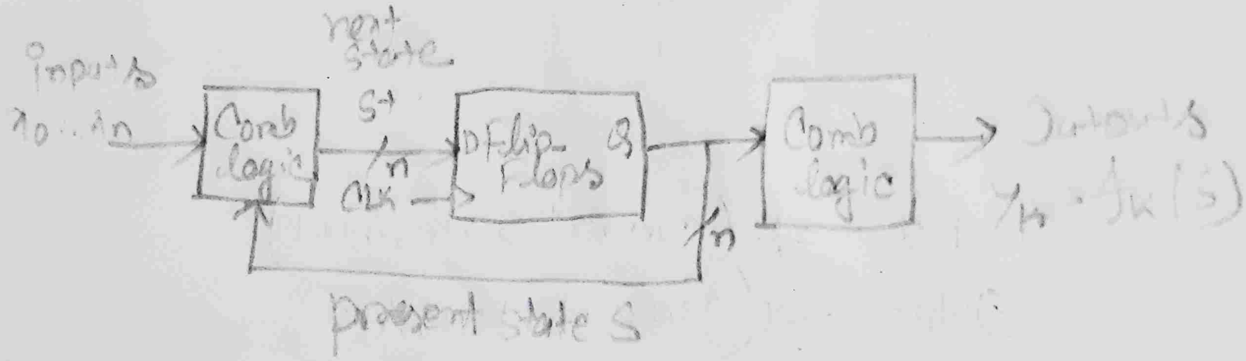
Next state = F (current state, input)

Output = G (current state, input)

c) Moore state machine:-

In the theory of computation, a Moore machine is a final state transducer where the outputs are determined by the current state alone (and do not depend directly on the input). The state diagram for a moore machine will include an output signal for each state.





Output = G (current state)

Ans to the Q no-4

a) Basic principles in "Design Procedure":-

1 Boolean Algebra:-

Boolean algebra is branch of mathematics that deals with the computational logic of digital circuits. It helps us in easing out digital circuits.

2 Logic gates:-

They are building blocks for any digital circuits.

3 Combinational Logic Design:-

It is a process/technique of designing digital systems that performs a specific operation based on the input provided. Combinational logic gates are used in these systems to modify the inputs and produce the desired outputs.

b) Register:- Flip-flop is a 1 bit memory cell which can be used for storing the digital data. To increase the storage capacity in terms of numbers of bits, we have to use a group of flip flop. Such a group of flip is known as register.

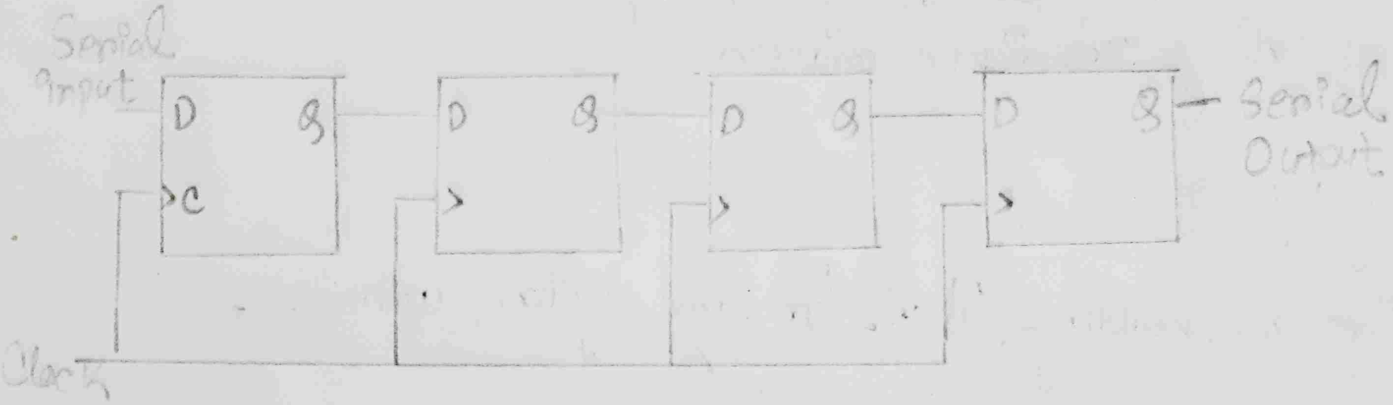


Fig:- Four bit register

(c) Three decade decimal BCD counter:-

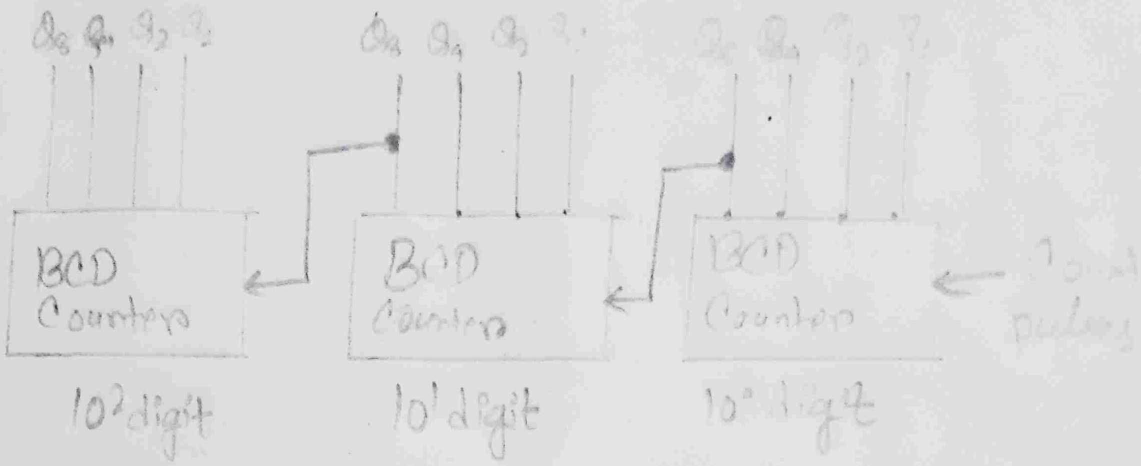


Fig - Three decade decimal BCD counter.