Victoria University
of Bangladesh

MID Term Assessment

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Answer to the question NO 1(a)

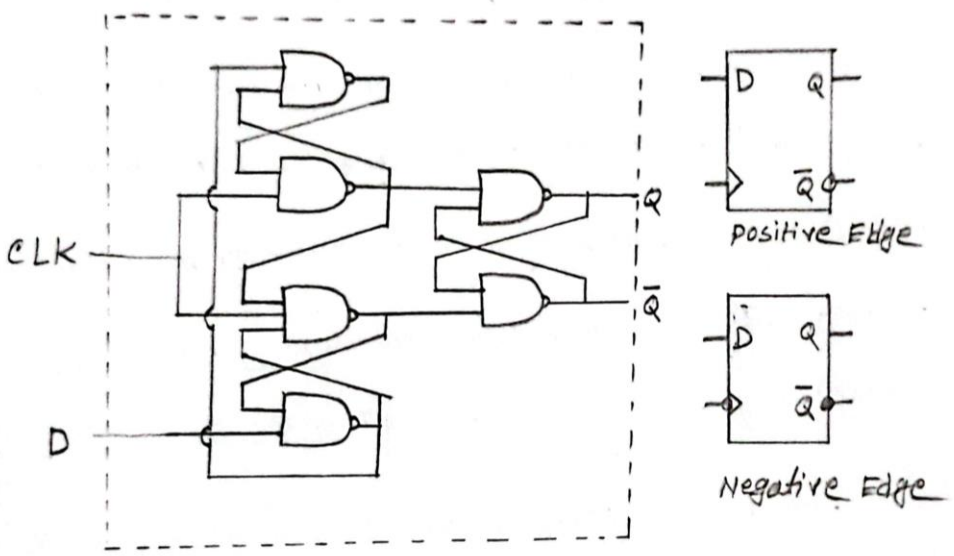
1.a) Answer:- In digital electronics a flip-flop is a fundamental sequential logic circuit element used to store binary information. It is a type of bistable multivibrator meaning. it has two stable state and can remain in either state until an external signal or trigger causes it to change it state. Flip-flops are widely used for various purposes in digital systems, such as storing data, implementing memory elements, synchronizing signals, and controlling the timing of operations.

There are different types of flip-flops -including:

1. SR Flip-Flop (set-Reset Flip-Flop)
2. D Flip-Flop (Data or delay Flip-Flop)
3. JK Flip-Flop
4. T Flip-Flop (Toggle Flip-Flop)

Here is the example :-

- Edge-Triggered D Flip-Flop (positive edge triggered)



- if D=0 when clk turns from 0 to 1, R→0, Q=0; 'reset state'
- if D changes while clk is high → Flip-Flop will not respond to the change.
- when clk turn from 1 to 0, Q= 0:, R→1, Flip-Flop will be in the same state (no change in output)
- if D=1 when clk from 0 to 1, S→0, Q=1: 'set state'

Answer to the question NO 1(b)

1.b) Answer:- Two types of sequential circuits.

Sequential circuits are digital circuits that use memory elements (such as flip-flops) to store past input history and use that stored information to determine that current output. They are classified into main types:—

- **Asynchronous sequential circuit**
  - depends upon the input signals at any instant of time and their change order.
  - may have better performance but hard to design

- **synchronous sequential circuit**
  - defined from the knowledge of its signals at discrete instants of time
  - much easier to design (preferred design style)
  - synchronized by a periodic train of clock pulses.

Answer to the question no 3(a)

3.a) ~~Answer:~~ -Define mealy models

Answer:- The mealy model:- the outputs are functions of both the presents state and inputs

- the outputs may change if the inputs change during the clock pulse periods.
- the output may have momentary false values unless the inputs are synchronized with the clocks.

Define moore model

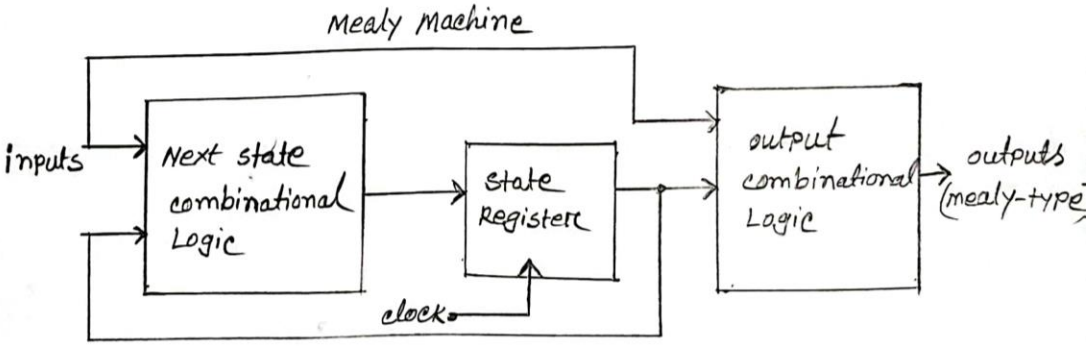
Answer:- the moore model:- the outputs are functions of the present state only.

- the outputs are synchronous with the clocks.

Answer to the question NO 3(b)

3.b) Ans:- the mealy model: the outputs are functions of both the present state and inputs

- the outputs may change if the inputs change during the clock pulse period.
- the outputs may have momentary false values unless the inputs are synchronized with the clocks.

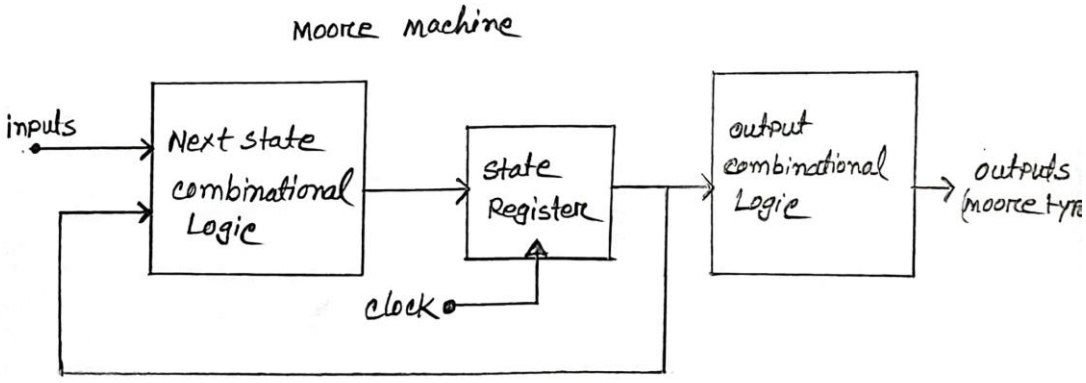


* Block diagram of mealy state machine.

Answer to the question no 3(c)

3.c) Answer:- The moore model: the outputs are functions of the present state only

- the outputs are synchronous with the clocks.



*Block diagram of moore state machine

Answer to the question NO 4(a)

4(a) Basic principles of "Design procedure"

Answer:- Basic principles of Design procedure

Derive a state diagram for the circuit from specifications.

Reduce the number of states if necessary

Assign binary values to the states

obtain the binary-coded state table

choose the type of flip-flop to be used

Derive the simplified flip-flop input equations and output equations.

Draw the logic diagram.

Answer to the question NO 4(b)

4:b) #Define Register

Answer:- Register: • A group of flip-flops.

• Gates that determine how the ~~Infor~~ information is transferred into the register.

• A register is a small, fast storage location in a computer's processor that temporarily holds data for immediate processing and manipula

Registers:-

• A n-bit register

• n flip-flops capable of storing n bits of binary information.

• 4-bit register is shown in Fig-1.

clear = 0 (Active low)

$A_x = 0$

clock = ↑, $A_x = I_x$

Normal operation;

clear = 1

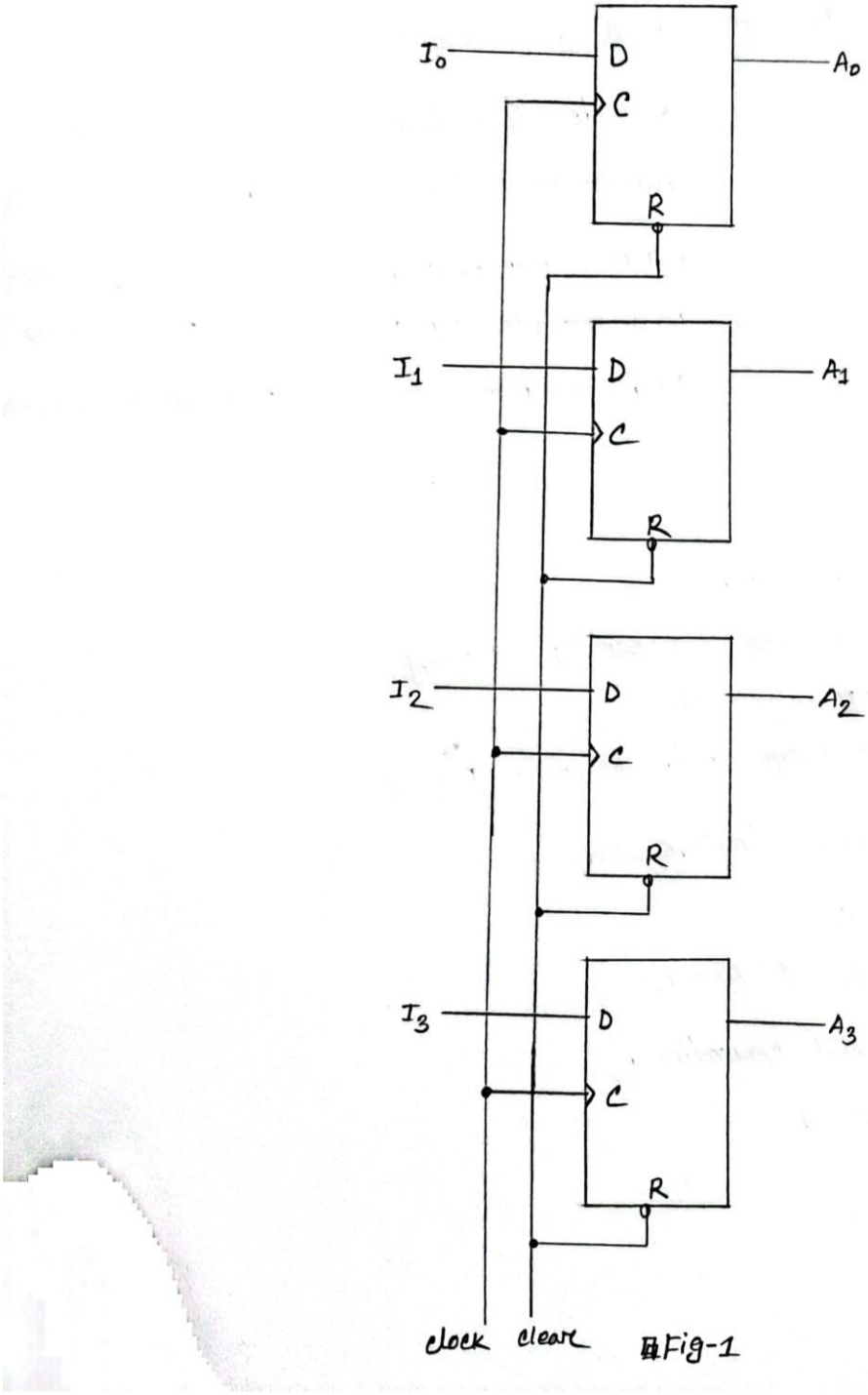


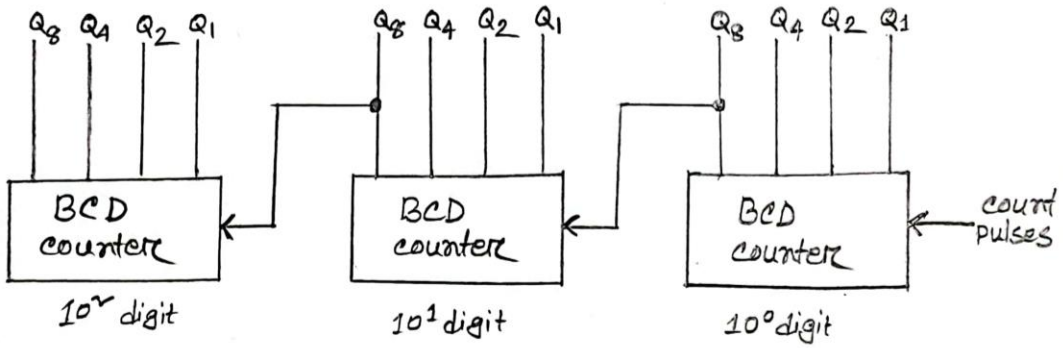
Fig-1

Answer to the question no 4(c)

4.c)

Answer :-

• Three-decade BCD counter



Block Diagram of a three-decade decimal BCD counter

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