# ASSIGNMENT 4

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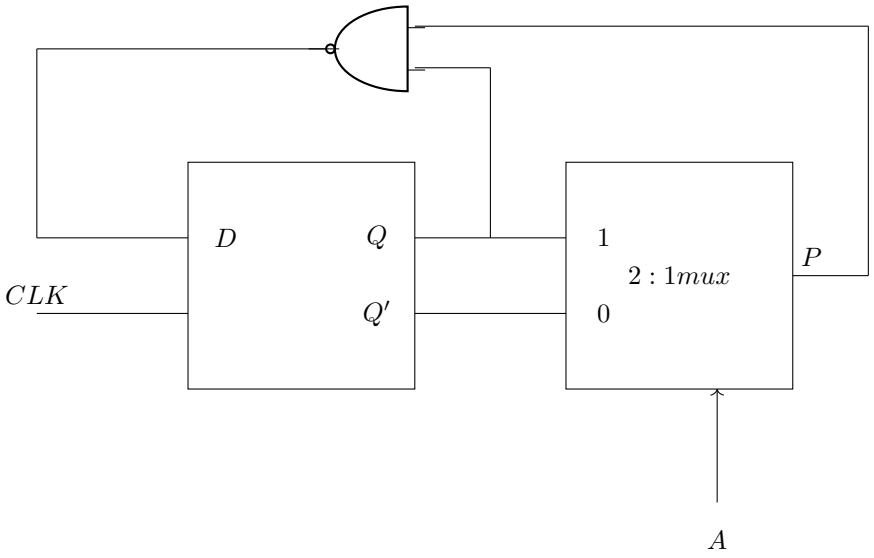
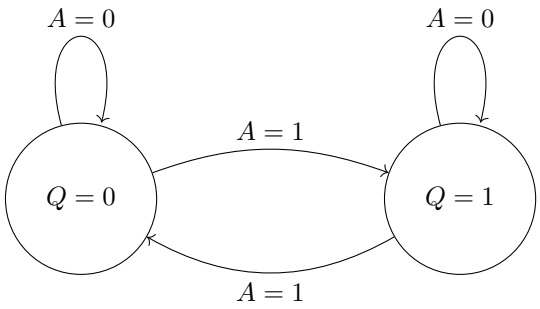
# 1 Problem

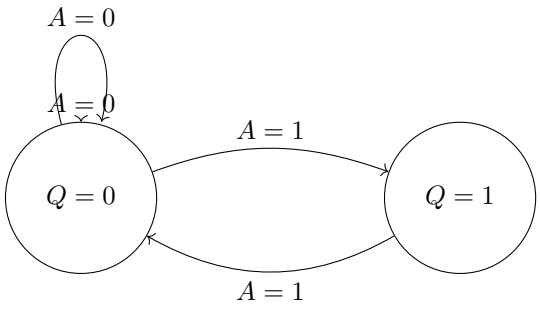
GATE EC-2020
Q.39. The state transition diagram for the circuit shown is



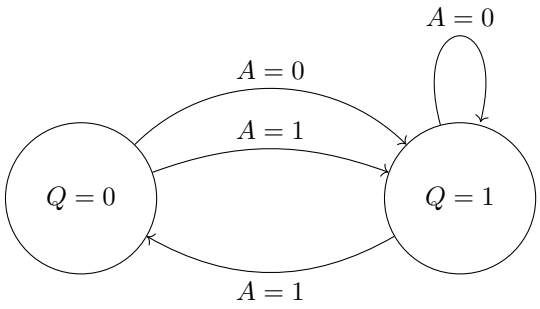

1. (A)



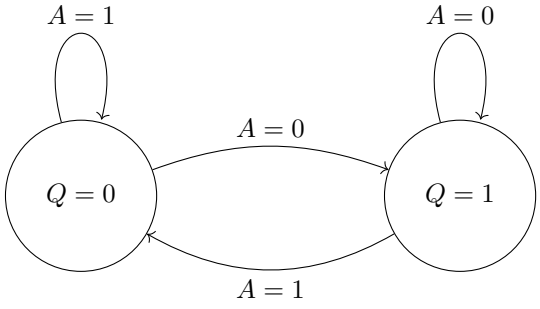
2. (B)




3. (C)




4. (D)



## 2 Components

| Component | Values | Quantity |
|---|---|---|
| ArduinoUNO | | 1 |
| JumperWires | M-M | 10 |
| Breadboard | | 1 |
| LED | | 1 |
| Resistor | 220ohms | 1 |

## 3 Reduction of logical circuit

The output of 2:1 mux is P.
Now , $P = AQ + A'Q'$
$D = (Q.P)'$
$D = (Q(AQ + A'Q'))'$
$D = (A(Q.Q) + (A'Q'Q))'$ $D = (AQ)'$
The equation after reducing the logical circuit is:
$D = (AQ)'$

## 4 Truth table

| Q | A | Q' | Input(D) | Clock | Next State(Q+) |
|---|---|---|---|---|---|
| 0 | 0 | 1 | 1 | ↑ | 1 |
| 1 | 0 | 0 | 1 | ↑ | 1 |
| 1 | 1 | 0 | 0 | ↑ | 0 |
| 0 | 1 | 1 | 1 | ↑ | 1 |

## 5 Next stages

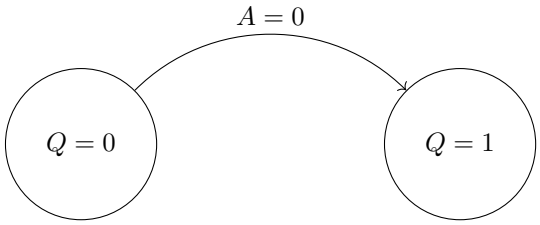



Figure 1: Stage 1

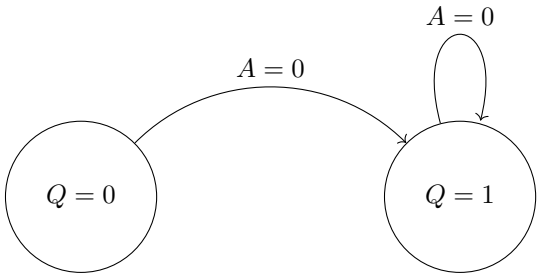



Figure 2: Stage 2

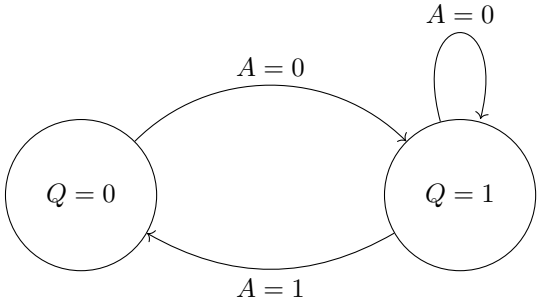



Figure 3: Stage 3

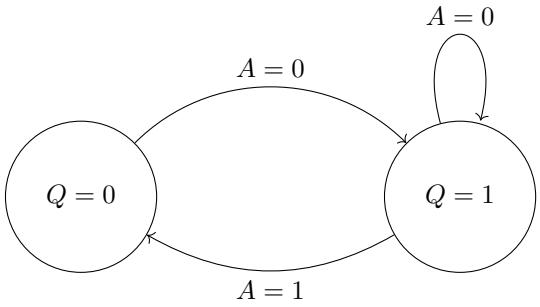



Figure 4: Stage 4

# 6 implementation

| **Arduino pin** | **INPUT** | **OUTPUT** |
|---|---|---|
| 2 | Q | |
| 3 | A | |
| 8 | | D |

# 7 Procedure

1. Connect the circuit as per the above table.
2. Connect the Output pin D to the LED.
3. Connect the other end of the LED to the Ground terminal.
4. Connect inputs to Vcc for logic 1,ground for logic 0.
5. Execute the circuits using the below code.

https://github.com/BharathMorri/EC392019/tree/main/code

6. Change the values of Q and A in the code and verify the Truth table .