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LAB 7
DIGITAL SYSTEMS AND MICROCONTROLLERS

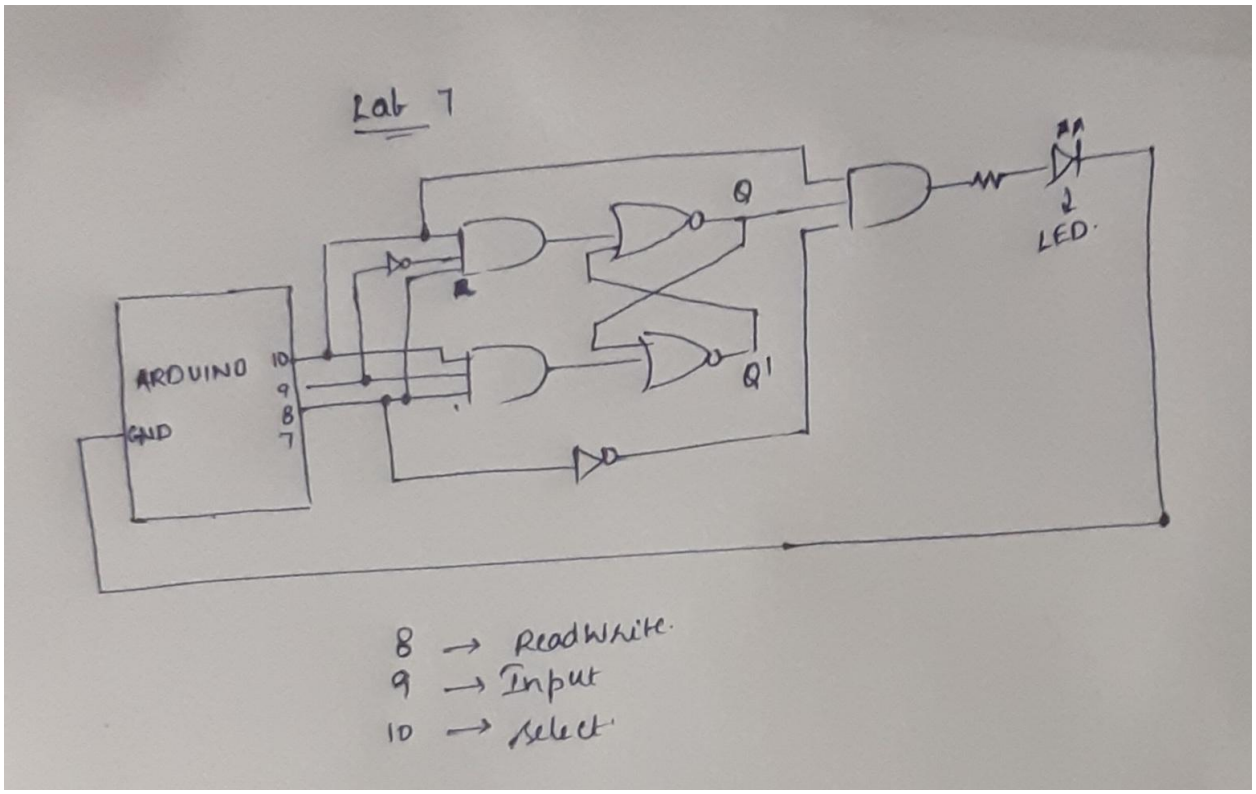
AIM **:**

- To implement and verify the operation of the binary cell of RAM based on RS FlipFlop as stated later .

ELECTRONIC COMPONENTS **:**

- Arduino
- Breadboard
- NOR Gate , 3 input AND Gate , NOT Gate
- LED , Resistor

REFERENCE CIRCUIT **:**



PROCEDURE **:**

- The cell has 3 inputs and 1 output . 3 inputs are ReadWrite , Input , Select .
- The Select input is used to access the cell either for reading or writing .
- ReadWrite -> 1 signifies the Write operation and ReadWrite -> 0 signifies the Read operation.
- If the Select input is 1 and ReadWrite is 1 then the value placed into the cell only depends on the input i.e if input is 1 then the value stored in the cell is 1 , if the input is 0 then the value stored in the cell is 0.In this case the output will be zero.

- **If the Select input is 1 and ReadWrite is 0 then value stored in the cell is given as output thus reading the value inside the cell .In this case the cell does not take any inputs from any input . So output is the value which is previously stored in the cell . If initially the stored value in the cell is 1 then the output will be 1 else the output is 0.**
- **Code :**

```
int select = 8;
int input = 9;
int readwrite = 10;
void setup()
{
  pinMode(8,OUTPUT);
  pinMode(9,OUTPUT);
  pinMode(10,OUTPUT);
  Serial.begin(9600);//sets the data rate to 9600 bps
}
void loop()
{
  Serial.print("ReadWrite:");
  while(Serial.available()==0){};
  readwrite = Serial.read();
  readwrite = readwrite - '0' ;
  Serial.println(readwrite);
  digitalWrite(10,readwrite);

  Serial.print("input:");
  while(Serial.available()==0){};
  input = Serial.read();
  input = input - '0' ;
  Serial.println(input);
  digitalWrite(9,input);

  Serial.print("select:");
  while(Serial.available()==0){};
  select = Serial.read();
  select = select - '0' ;
  Serial.println(select);
  digitalWrite(8,select);
}
```

***OBSERVATIONS* :**

- **When the Select line is 1 and ReadWrite is 1 then the value stored in the cell is only dependent on the input .**

- **When the select line is 1 and ReadWrite is 0 the the output is only dependent on the value stored in the cell .**
- **When the select line is 0 , the value of the output of the flipflop (Q) is same as the previous value of Q .But the output will be zero .**

***LINK TO TINKERCAD SIMULATION* :**

https://www.tinkercad.com/things/hThxJjHPZEJ-grand-bruticus/editel?sharecode=HYTVnuLRPMHCm6AyEcFW3qpdxHe6HmjVhZecx2lYTtg