LAB REPORT : 3

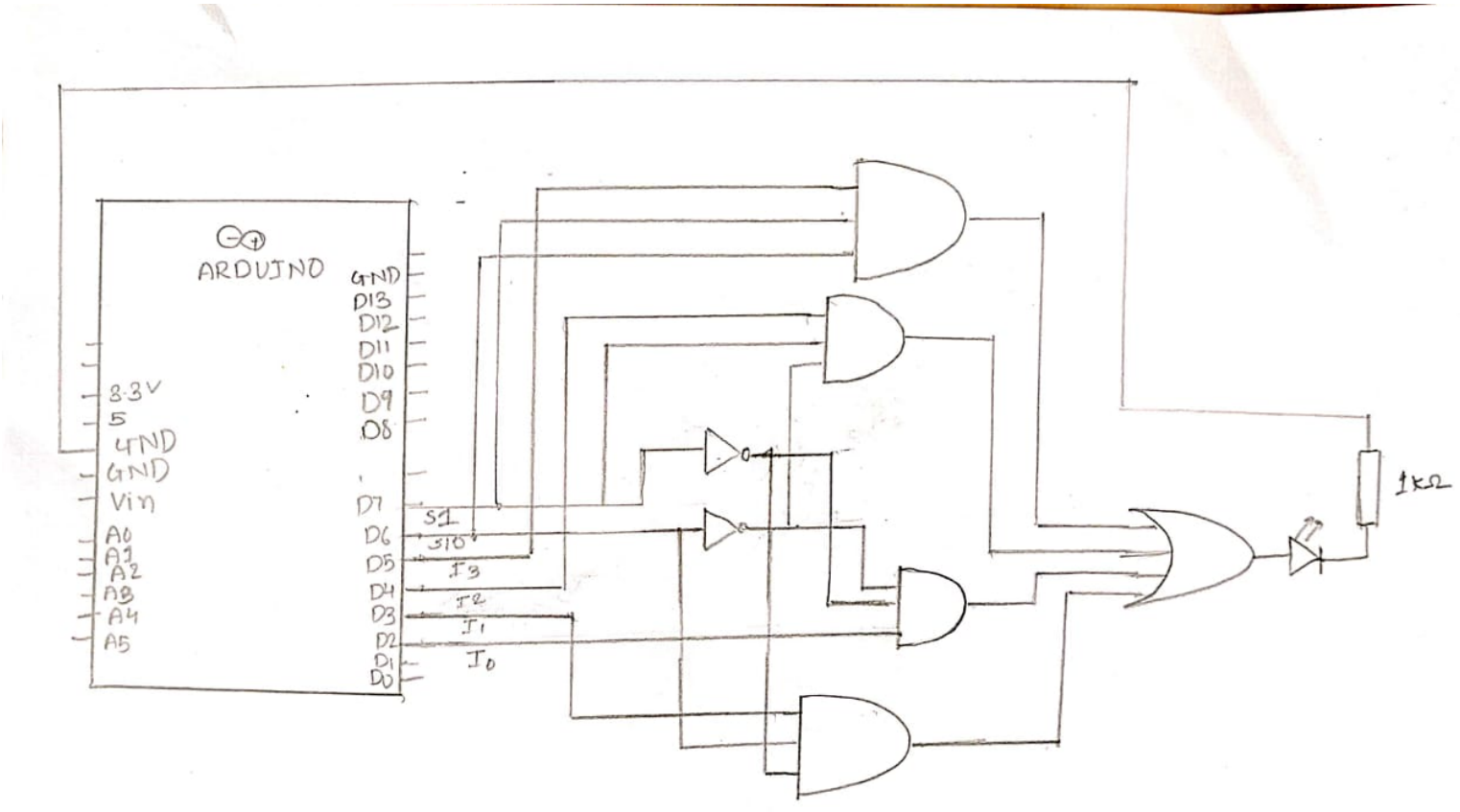
NAME: Arya Marda
ROLL NUMBER : 2021102021
GROUP NUMBER : 3

PART A:

AIM : To design, assemble and test a (1:4) Multiplexer using basic logic gates (whose select lines and inputs are through Arduino).

Electronic components used : Wires , LED, Resistors, Arduino uno, breadboard , NOT gateIC, AND gate IC, OR gate IC.

Reference circuit :



Procedure :

1)A multiplexer (or mux) is a device that selects one of several analog or digital input signals and forwards the selected input into a single line A multiplexer with 2 ^n inputs has n select lines, which are used to select which input line to send to the output.

2) We will be using an inverter IC (74HC04), 2 AND gate ICs (74HC11) and 1 OR gate ICs (74HC32).

3)Take inputs : S0, S1, I0 ,I1, I2, I3.

4)OutPut should be like :If S1=0 and S0=0 then Y = I 0

If S1= 0 and S0=1, the Y = I 1

If S1=1 and S0=0, then Y = I 2

If S1=1 and S0=1 the Y = I 3

5) Using AND gates to out put desired output :

1st AND gate Y = I0(S1)'(S0)'
2nd AND gate: Y = I1(S1)'S0
3rd AND gate: Y = I2S1(S0)'
4th AND gate : Y = I3S1S0

6) Using 2 OR gates to or Y1+Y2+Y3+Y4.

Code:

```
int pin1 = 2;
int pin2 = 3;
int pin3 = 4;
int pin4 = 5;
int pin5 = 6;
int pin6 = 7;


int k,i0,i1,i2,i3,s0,s1;

void setup()
{
pinMode(pin1, OUTPUT);
```

```
pinMode(pin2, OUTPUT);
pinMode(pin3, OUTPUT);
pinMode(pin4, OUTPUT);
pinMode(pin5, OUTPUT);
pinMode(pin6, OUTPUT);
Serial.begin(9600);
}

void loop()
{
Serial.print("\i0=");
while(Serial.available() == 0){}
i0=Serial.read();
i0=i0-'0';
Serial.println(i0);

Serial.print("\i1=");
while(Serial.available() == 0){}
i1=Serial.read();
i1=i1-'0';
Serial.println(i1);

Serial.print("\i2=");
while(Serial.available() == 0){}
i2=Serial.read();
i2=i2-'0';
Serial.println(i2);

Serial.print("\i3=");
while(Serial.available() == 0){}
i3=Serial.read();
i3=i3-'0';
Serial.println(i3);

Serial.print("\s0=");
while(Serial.available() == 0){}
s0=Serial.read();
s0=s0-'0';
Serial.println(s0);

Serial.print("\s1=");
while(Serial.available() == 0){}
```

```
s1=Serial.read();
s1=s1-'0';
Serial.println(s1);

digitalWrite(pin1,i0);
digitalWrite(pin2,i1);
digitalWrite(pin3,i2);
digitalWrite(pin4,i3);
digitalWrite(pin5,s0);
digitalWrite(pin6,s1);

Serial.println("Enter anything to go to Read again");
while(Serial.available() == 0){}
k=Serial.read();


}
```

Conclusion:

S0	S1	OUTPUT
0	0	I0
0	1	I1
1	0	I2
1	1	I3

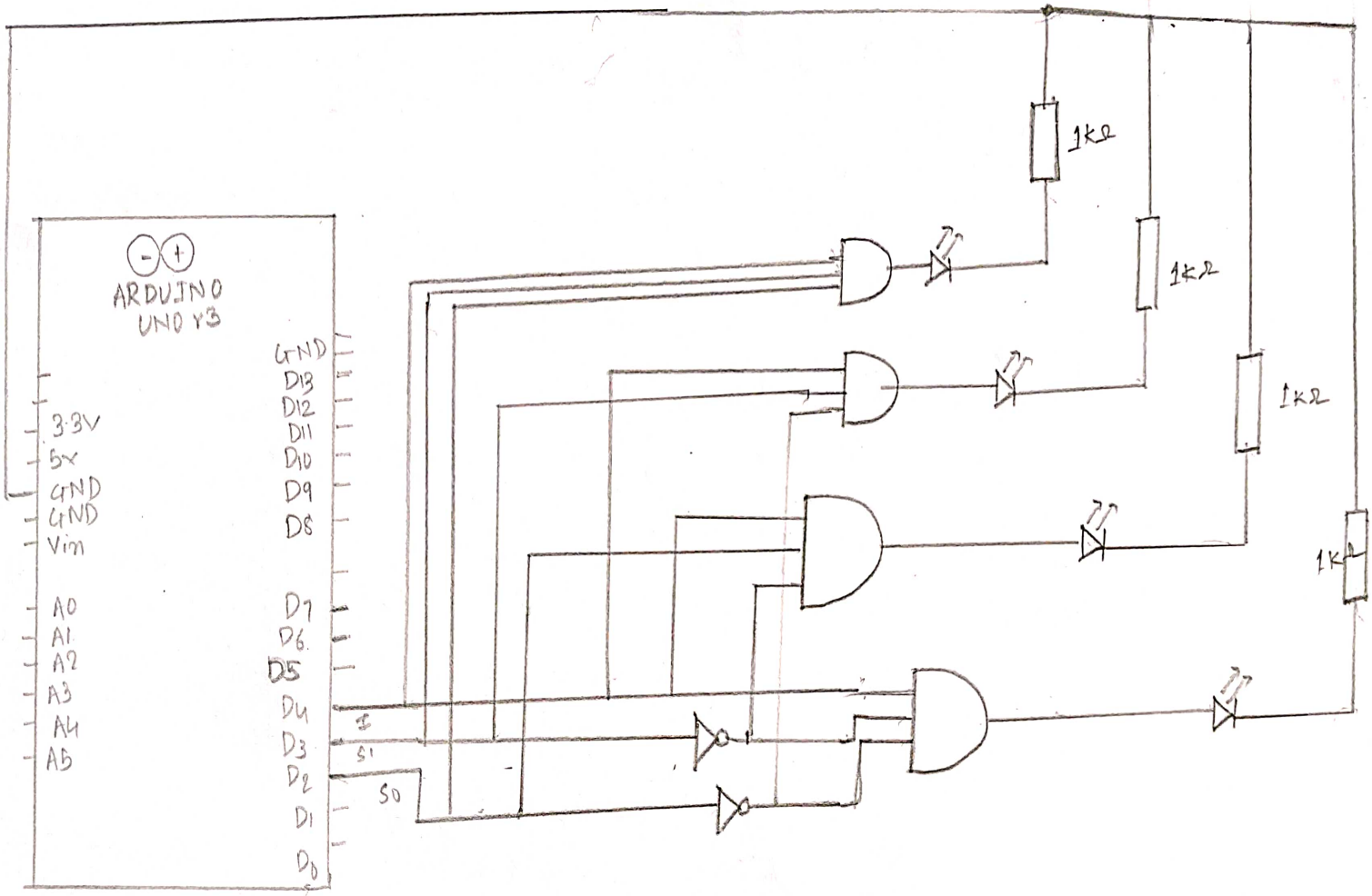
Link:
https://www.tinkercad.com/things/akH6NlpET1u

PART B:

AIM : To design, assemble and test a (4:1) De-multiplexer using basic logic gates (whose select lines and inputs are through Arduino).

Electronic components used : Wires , LED, Resistors, Arduino uno,
breadboard , NOT gate IC, AND gateIC.

Reference circuit :



Procedure :

1)A 1-to-4 demultiplexer consists of one data input line as i, two select lines as S0 and S1 and four output lines as y0, y1, y2 and y3. The select lines S0 and S1 select one of the four output lines (y0 through y3) to connect to the input line.

2) We will be using an inverter IC (74HC04), 2 AND gate ICs (74HC11) .

3)Take inputs : S0, S1,i.

4)OutPut should be like :If S1=0 and S0=0 then y0 = i

If S1= 0 and S0=1, the y1= i

If S1=1 and S0=0, then y2 =i

If S1=1 and S0=1 the y3 = i

5) Using AND gates to out put desired output :

1st AND gate y0 = i(S1)'(S0)'
2nd AND gate: y1 = i(S1)'S0
3rd AND gate: y2 = iS1(S0)'
4th AND gate : y3 = iS1S0

Code:

```
int pin2 = 2;
int pin3 = 3;
int pin4 = 4;

int s0, s1, i , k;

void setup()
{
pinMode(pin2, OUTPUT);
```

```
pinMode(pin2, OUTPUT);
 pinMode(pin4, OUTPUT);
Serial.begin(9600);
}

void loop()
{
Serial.print("\ns0=");
while(Serial.available() == 0){}
s0=Serial.read();
s0=s0-'0';
Serial.println(s0);

Serial.print("\ns1=");
while(Serial.available() == 0){}
s1=Serial.read();
s1=s1-'0';
Serial.println(s1);

Serial.print("i=");
while(Serial.available() == 0){}
i=Serial.read();
i=i-'0';
Serial.print(i);

digitalWrite(pin2,s0);
digitalWrite(pin3,s1);
digitalWrite(pin4,i);

Serial.print("Enter anything to go to Read again");
while(Serial.available() == 0){}
k=Serial.read();


}
```

Conclusion:

S0	S1	I0	I1	I2	I3
0	0	i	0	0	0
0	1	0	i	0	0
1	0	0	0	i	0
1	1	0	0	0	i

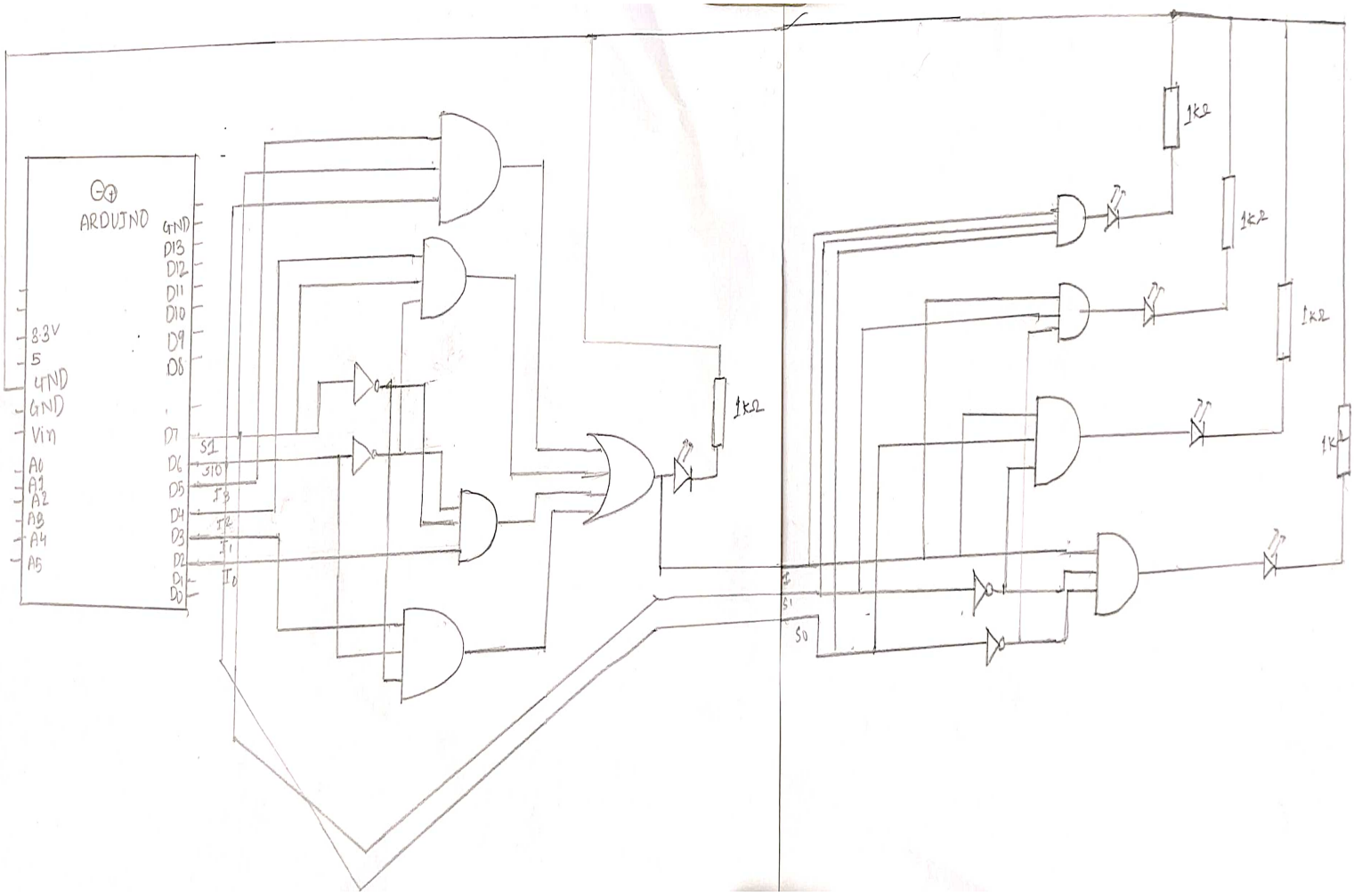
LINK:https://www.tinkercad.com/things/gsbvsSU13iy

Part C:

AIM : To design, assemble and test a (1:4) Multiplexer and (4:1) DeMultiplexer using basic logic gates (whose select lines and inputs are through Arduino).

Electronic components used : Wires , LED, Resistors, Arduino uno, breadboard , NOT gateIC, AND gate IC, OR gate IC.

Reference circuit :



Procedure:

1)Assemble circuits in part A, part B such that they have common input of s0 and s1.

2)Connect output of Part A as i(input in part B) .

Code:

```
int pin1 = 2;
int pin2 = 3;
int pin3 = 4;
int pin4 = 5;
int pin5 = 6;
int pin6 = 7;
```

```
int k,i0,i1,i2,i3,s0,s1;

void setup()
{
pinMode(pin1, OUTPUT);
pinMode(pin2, OUTPUT);
pinMode(pin3, OUTPUT);
pinMode(pin4, OUTPUT);
pinMode(pin5, OUTPUT);
pinMode(pin6, OUTPUT);
Serial.begin(9600);
}

void loop()
{
Serial.print("\i0=");
while(Serial.available() == 0){}
i0=Serial.read();
i0=i0-'0';
Serial.println(i0);

Serial.print("\i1=");
while(Serial.available() == 0){}
i1=Serial.read();
i1=i1-'0';
Serial.println(i1);

Serial.print("\i2=");
while(Serial.available() == 0){}
i2=Serial.read();
i2=i2-'0';
Serial.println(i2);

Serial.print("\i3=");
while(Serial.available() == 0){}
i3=Serial.read();
i3=i3-'0';
Serial.println(i3);

Serial.print("\s0=");
while(Serial.available() == 0){}
```

```
s0=Serial.read();
s0=s0-'0';
Serial.println(s0);

Serial.print("\s1=");
while(Serial.available() == 0){}
s1=Serial.read();
s1=s1-'0';
Serial.println(s1);

digitalWrite(pin1,i0);
digitalWrite(pin2,i1);
digitalWrite(pin3,i2);
digitalWrite(pin4,i3);
digitalWrite(pin5,s0);
digitalWrite(pin6,s1);

Serial.println("Enter anything to go to Read again");
while(Serial.available() == 0){}
k=Serial.read();


}
```

Conclusion: Output is as expected.

Link:
https://www.tinkercad.com/things/dkNPbxtatov