

# SCS2213 - ELECTRONICS AND PHYSICAL COMPUTING

## ONLINE PRACTICAL TEST 3

### Arduino & Digital Electronics

Duration: 1 1/2 hours

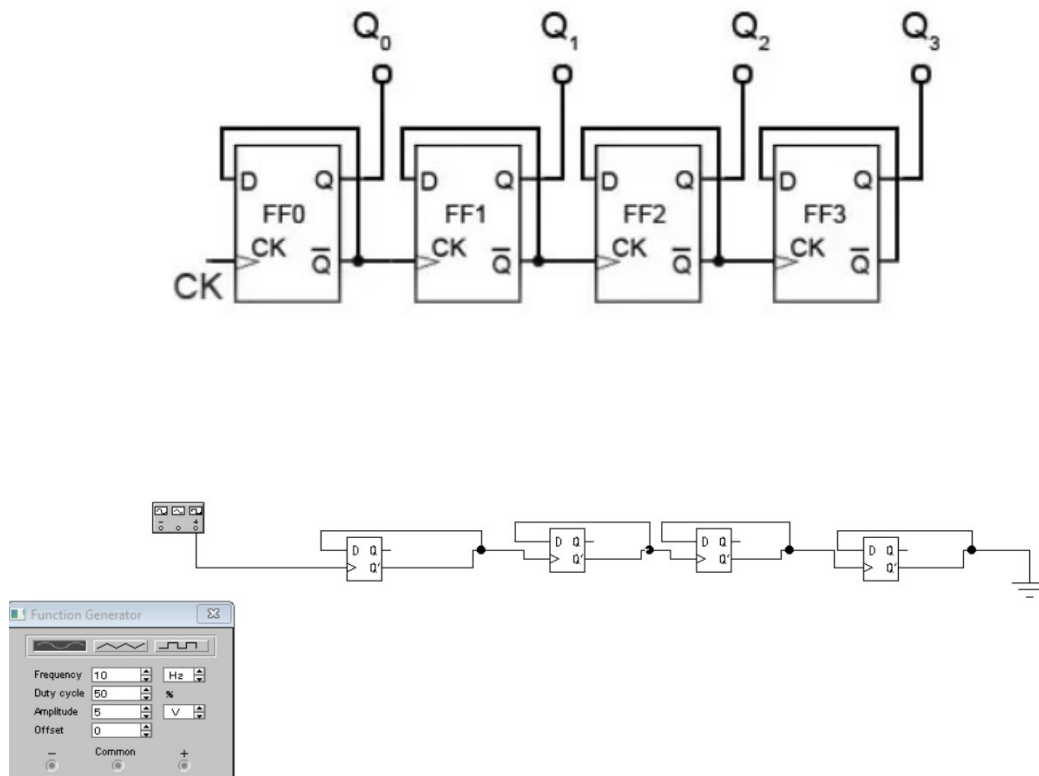
Index No:18000231

Answer the following questions and attach the required code and screenshots. Upload a file in pdf format with your index number.

#### Question 1

- I. In EWB, construct a 4-bit counter using D Flip Flops as in the figure 1.
- II. Provide the clock signal to the counter using the function generator. Set the function generator output as 10 Hz, 5V digital signal.

Figure 1: 4-bit D-Flip flop counter



III. Identify the LSB output and MSB output.

LSB Q3

MSB Q0

IV. Connect the flip-flop outputs to 7447 IC and connect the IC to a Seven-Segment display.  
(Refer figure 2)

V. What is the purpose of the 7447 IC?

Otherwisewe should build a truth table with the number of inputs and build up a function for each of the 7 outputs. But instead of doing such a lengthy task, ready made BCD to 7 segment driver ICs are available.

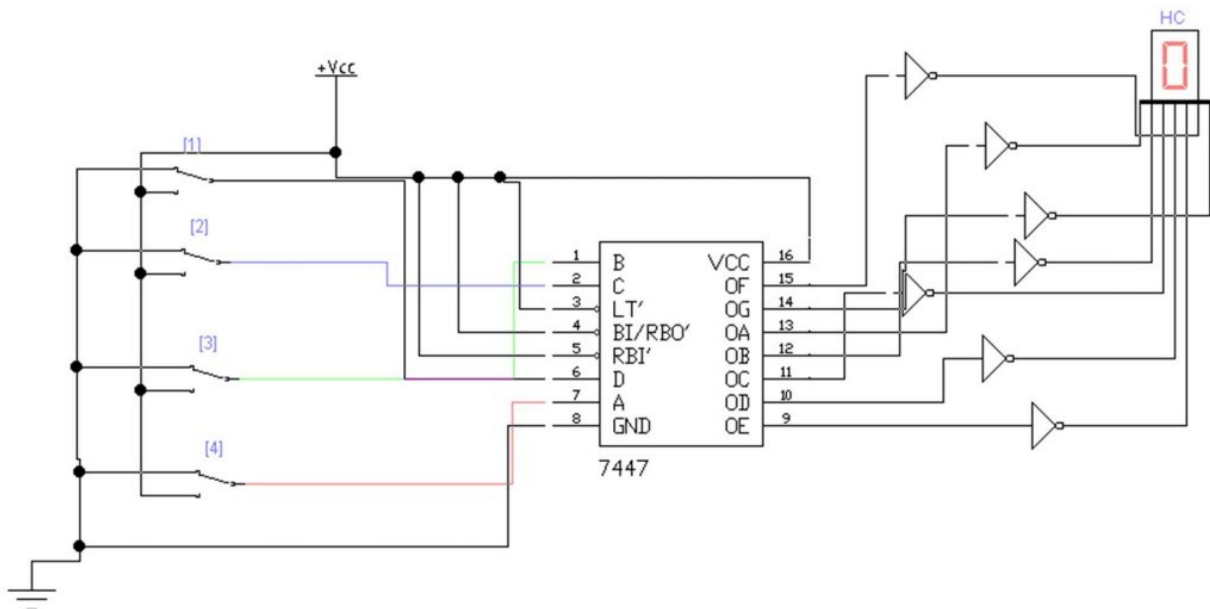
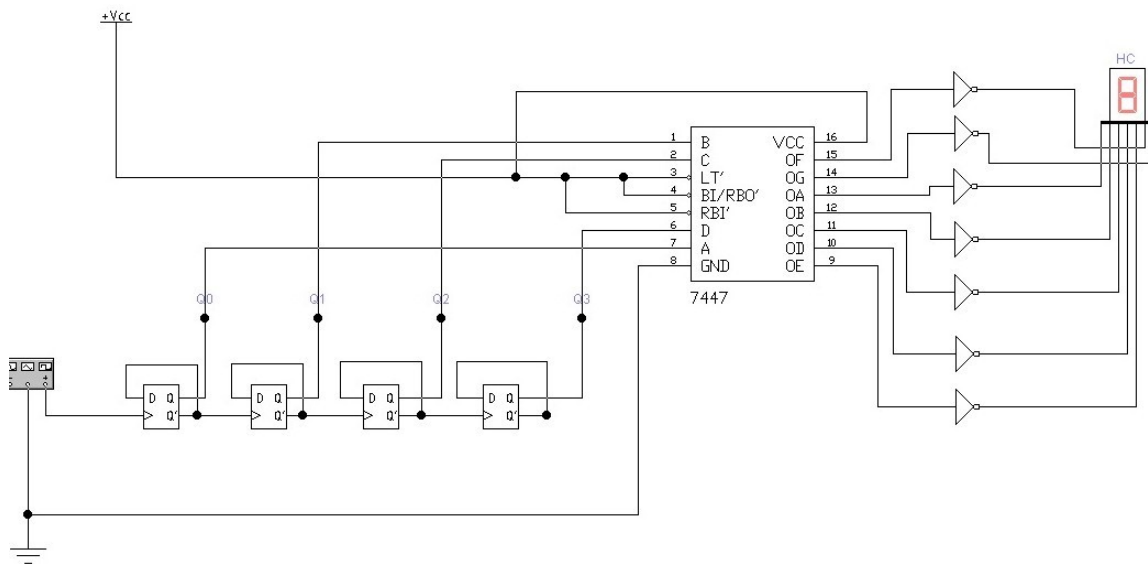


Figure 2: Decimal Counter

VI. Attach a screenshot of the completed circuit.

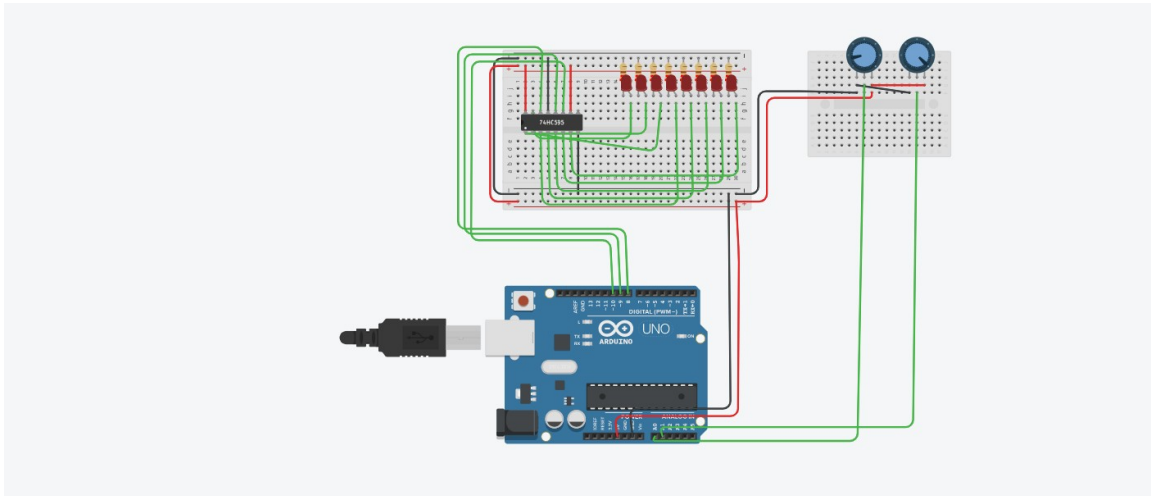


## Question 2

Using TinkerCAD, design a circuit that can represent 8-bit number by 8 LED array. Use 2 variable resistors, one to provide the counter value and the other to change the intensity of each LED. Use  $220\ \Omega$  as the resistor value.

1. What is/are the
  - a. The sensor/s in this circuit  
potentiometer
  - b. The actuator on this circuit  
led
2. Briefly explain how you change the intensity of 8 LEDs.

3. Attach a screenshot of the completed circuit diagram.



4. Attach the final code.

```
int DATA=8;
```

```
void setup()

{

  Serial.begin(9600);

    pinMode(9,OUTPUT);

    pinMode(10,OUTPUT);

    pinMode(DATA,OUTPUT);

    pinMode(A0,INPUT);

    pinMode(A1,INPUT);


}

void loop()

{

  analogWrite(11,map(analogRead(A1),0,1023,0,255));

  for (int l=0;l<=23;l++)

  {

    Serial.println(analogRead(A0));

    digitalWrite(9,LOW);

    shiftOut(DATA,10,MSBFIRST,byte(analogRead(A0)));

    digitalWrite(9,HIGH);

    delay(100);

  }
```

