Lab Exercise: 2

1. **Aim**:

To design a simple LED blinking circuit by drawing a circuit diagram and executing it on a breadboard using an Arduino microcontroller.

2. **Materials Required:**

   - Arduino Uno
   - Breadboard
   - LED (any color)
   - 220Ω resistor
   - Jumper wires
   - USB cable for Arduino
   - Computer with Arduino IDE installed

3. **Circuit Diagram:**

   - Students will first draw a circuit diagram showing the connections between the Arduino, LED, resistor, and ground.
   - The positive leg (anode) of the LED is connected to a digital pin (e.g., pin 13) on the Arduino through a 220Ω resistor.
   - The negative leg (cathode) of the LED is connected to the ground (GND) of the Arduino.

4. **Procedure:**

   1. **Draw the Circuit Diagram:**
      - Use a paper or software like Fritzing/TinkerCAD to create the circuit diagram.
   2. **Assemble the Circuit on the Breadboard:**
      - Place the LED on the breadboard.
      - Connect the longer leg (anode) of the LED to one end of the 220Ω resistor.
      - Connect the other end of the resistor to digital pin 13 of the Arduino.
      - Connect the shorter leg (cathode) of the LED to the GND pin of the Arduino.
   3. **Write and Upload the Code:**
      - Open the Arduino IDE and write the following code:

```
void setup() {
    pinMode(13, OUTPUT); // Set pin 13 as an output
}
void loop() {
    digitalWrite(13, HIGH); // Turn the LED on
    delay(1000); // Wait for one second
    digitalWrite(13, LOW); // Turn the LED off
    delay(1000); // Wait for one second
}
```

4. **Upload the Code to Arduino:**
   - Connect the Arduino board to the computer using a USB cable.
   - Select the correct board and COM port in Arduino IDE.
   - Click on the upload button to transfer the code.
5. **Observe the Output:**
   - If the circuit and code are correct, the LED should blink with a 1-second interval.

5. Expected Output:

The LED will turn on for one second and turn off for one second repeatedly, indicating that the circuit is functioning correctly.

6. Conclusion:

Students successfully designed and implemented a basic IoT circuit for blinking an LED using an Arduino microcontroller. This exercise provides fundamental knowledge of circuit connections and programming in Arduino.