**ASSIGNMENT 3**

**Q) Explain the basic structure of an Arduino program ?**

**Ans:** An Arduino program consists of two main functions:

1) Setup(): Runs once at the start to initialize settings like pin modes.

void setup() {

// Initialization code here

}

2) Loop(): Runs repeatedly to execute the main logic of the program.

void loop() {

// Code that runs repeatedly

}

**Q) Blink inbuilt LED of your board and explain the program you wrote to blink it  
Explain these methods  
i) pinMode(LED\_BUILTIN, OUTPUT)  
ii) digitalWrite(LED\_BUILTIN, HIGH)**

**Ans:** // Arduino Code

void setup() {

pinMode(LED\_BUILTIN, OUTPUT); // Set the LED\_BUILTIN pin as an output

}

void loop() {

digitalWrite(LED\_BUILTIN, HIGH); // Turn the LED on

delay(1000); // Wait for one second (1000 milliseconds)

digitalWrite(LED\_BUILTIN, LOW); // Turn the LED off

delay(1000); // Wait for one second

}

// Explanation of the Program

* void setup() Function:
* The setup() function runs once when you press the reset button or power the board.
* Here, you configure the pin connected to the built-in LED as an output. This tells the board that you intend to send a signal to the pin (to turn the LED on or off).
* pinMode(LED\_BUILTIN, OUTPUT):
* This line of code sets the mode of the pin connected to the built-in LED to "OUTPUT".
* LED\_BUILTIN is a constant that refers to the pin number connected to the onboard LED, which varies depending on the Arduino model (e.g., pin 13 on many Arduino boards).
* The pinMode function configures the specified pin to behave either as an input or an output. In this case, setting it as an output allows the board to control the LED.
* void loop() Function:
* The loop() function runs continuously after the setup() function. This is where you put the code that you want to run over and over again.
* In this case, it turns the LED on and off repeatedly.
* digitalWrite(LED\_BUILTIN, HIGH):
* This line of code sends a high signal (5V on most Arduino boards) to the pin connected to the LED, which turns the LED on.
* digitalWrite is a function that sets the voltage level of a pin, either HIGH (5V) or LOW (0V).
* HIGH means applying 5V (or 3.3V, depending on the board) to the pin, which in this case, lights up the LED.
* delay(1000):
* This function pauses the program for a specified time, in milliseconds. Here, 1000 milliseconds equals one second.
* This delay keeps the LED on or off for one second before switching states.
* digitalWrite(LED\_BUILTIN, LOW):
* This line of code sends a low signal (0V) to the pin connected to the LED, which turns the LED off.
* LOW means applying 0V to the pin, which turns off the LED.
* Repeat:
* After the LED turns off and the delay completes, the loop starts again, turning the LED on and off indefinitely.

**Q) LED\_BUILTIN, OUTPUT,, LOW, HIGH: What do they actually refer to ?**

**Ans:**  1) LED\_BUILTIN: The pin number connected to the onboard LED (usually pin 13 on boards).

2) OUTPUT: Sets a pin as an output, allowing the Arduino to control it (e.g., turning an LED on or off).

3) HIGH: Sets the pin to 5V (or 3.3V), turning the connected device (like an LED) on.

4) LOW: Sets the pin to 0V, turning the connected device (like an LED) off.

**Q)  What is the purpose of the setup() function in Arduino programming?**

**Ans:** The setup() function runs once when the Arduino starts. It's used to initialize settings like pin modes, start serial communication, or set up libraries before the main program begins.

**Q)  What does the pinMode() function do in the setup() function?**

**Ans:** The pinMode() function in the setup() function sets whether a specific pin on the Arduino will be used as an input or output.

**Q) What is the role of the loop() function in Arduino programming?**

**Ans:** The loop() function in Arduino programming repeatedly executes the code within it, allowing the program to run continuously. It handles tasks that need to be repeated, such as reading sensor data or blinking an LED.

**Q)  what does the digitalWrite() function do?**

**Ans:** The digitalWrite() function sets a specified pin to either HIGH (5V or 3.3V) or LOW (0V). This allows you to turn devices like LEDs, motors, or relays on or off by controlling the voltage on the pin.

**Q) What is the significance of LED\_BUILTIN in the code?**

**Ans:** LED\_BUILTIN is a predefined constant that represents the pin number connected to the onboard LED of the Arduino. It simplifies code by allowing you to use a descriptive name instead of remembering the specific pin number, making it easier to control the built-in LED.

**Q) Why is there a delay() function in the loop() function, and what does it do?**

**Ans:** The delay() function in the loop() function pauses the program for a specified amount of time, in milliseconds. It controls how long the program waits before continuing to the next line of code. For example, delay(1000); pauses the program for one second. This is useful for creating time-based effects, like blinking an LED at regular intervals.

**Q)  How does the setup() function differ from the loop() function?**

**Ans:** The setup() and loop() functions serve different purposes in Arduino programming:

* setup() Function:

1. Runs once when the Arduino starts or resets.
2. Used to initialize settings, such as pin modes and serial communication.

* loop() Function:

1. Runs continuously after setup() completes.
2. Handles repetitive tasks, like reading sensors or updating outputs.

**Q) What will happen if you change the value in the delay() function from 1000 to 500?**

**Ans:** If we change the value in the delay() function from 1000 to 500, the time between each change in the LED's state will decrease from one second to half a second. This means the LED will blink on and off twice as fast, creating a faster blinking effect.

**Q) What is the significance of HIGH and LOW in the digitalWrite() function?**

**Ans:** In the digitalWrite() function:

1. HIGH: Sets the pin to a high voltage level (typically 5V or 3.3V), turning on connected devices like LEDs.
2. LOW: Sets the pin to a low voltage level (0V), turning off connected devices.

**Q) How would you modify the code to make the LED stay on for 2 seconds and off for 1 second?**

**Ans:** To make the LED stay on for 2 seconds and off for 1 second, you need to adjust the delay() durations in the loop() function.

Changes Made:

1. delay(2000): Sets the LED to stay on for 2 seconds.
2. delay(1000): Sets the LED to stay off for 1 second.