MNCASH003 SCHZEE001
Practical 1:

1. I2C (Inter-Integrated Circuit) is a synchronous communication protocol that enables serial data transfer/communication between controller chips and multiple digital integrated circuits.
2. An interrupt is a form of asynchronous signaling to the processors that points to events in hardware or software systems requiring attention. In the world of embedded systems, interrupts are crucial in breaking the flow of programs, such that they distinguish time-critical and non-time-critical instructions from both hardware and software processes. This allows the system to optimize processes, especially when systems have an influx of data requests and prioritizing execution is key. This ensures that the incoming data is not overwritten and increases efficiency in embedded system processes.
3.
    a. They are used so that the states of inputs are known and are not floating. The pull-up ensures that the unused pins are connected to high, as they are connected to the voltage supply. The pull-down ensures that the unused pins are set to low for a given input, as they are grounded
    b. Debouncing is a practice in programming in which time-consuming tasks are not called upon frequently such that they affect functionality and performance. Hardware debouncing refers to this method done by physical components whereas software debouncing refers to the usage of a program to achieve this effect.

In hardware debouncing, you can do so by adding a capacitor to the circuit.

In software debouncing, you can do so by use of a microcontroller or a single board computer, where you code a delay/wait procedure after a pulse has been detected before checking again.

In Software Debouncing:

```
var button = document.getElementById("debounce");
const debounce = (func, delay) => {
      let debounceTimer
      return function() {
            const context = this
            const args = arguments
                  clearTimeout(debounceTimer)
                        debounceTimer
                  = setTimeout(() => func.apply(context, args), delay)
      }
}
```

In Hardware Debouncing:
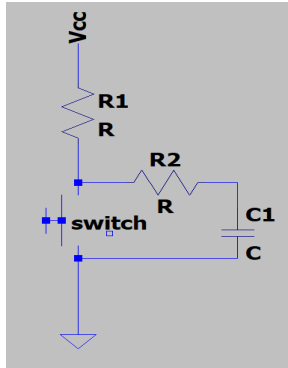
c. Polling is a synchronous protocol where the CPU checks the status of devices to determine whether it requires the CPUs attention. Interrupts have the advantage of better performance in the microcontroller as it is not constantly checking whether devices are ready when compared to the polling method. In the case of polling, data loss is more likely.

4. Circuit Diagram of the Implementation
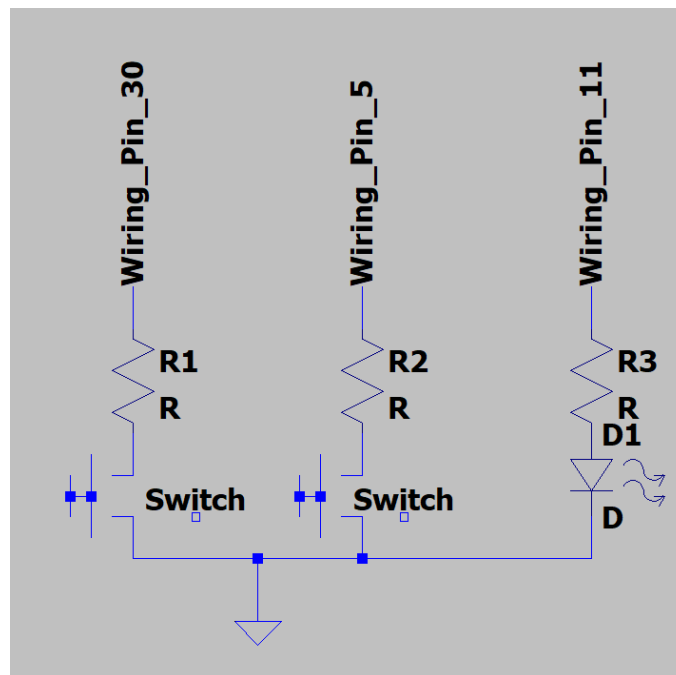
5. Core Functions of code

   i. . The core functions of the code are to provide actions to the button components in the circuit. The goal is to retrieve the minute and hour values from the RTC, increase the value of either the hours or minutes by 1 and rewrite these values back into the RTC. This is done by button 1 controlling the operations that change the minutes and button 2 controlling the changes in the hours. Interrupts and debouncing procedures are associated with the button actions. The code also flickers the LED on and off every second.

6. Github repository link:
   https://github.com/ZeviYS/EEE3095S_Prac1