# Sensors & Automation
# Experiment no:7

**Figure 1** ON Timer: Preset Value = 5000, Accumulator Value = 2600 < 5000

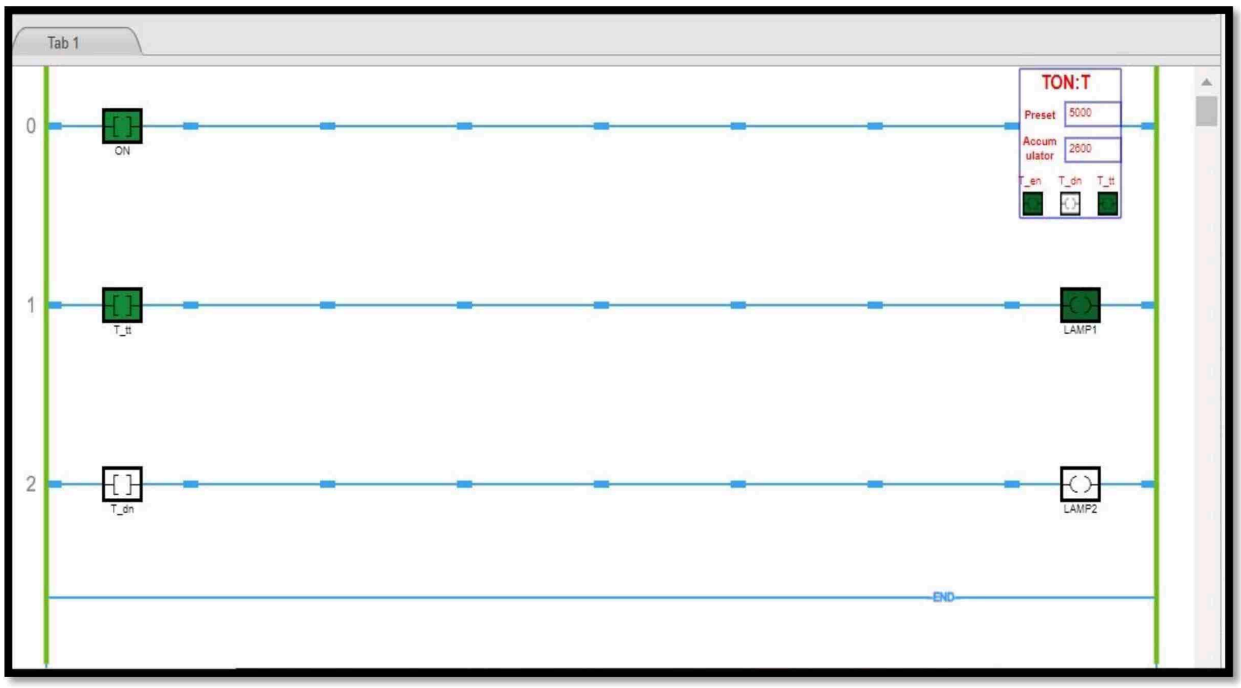
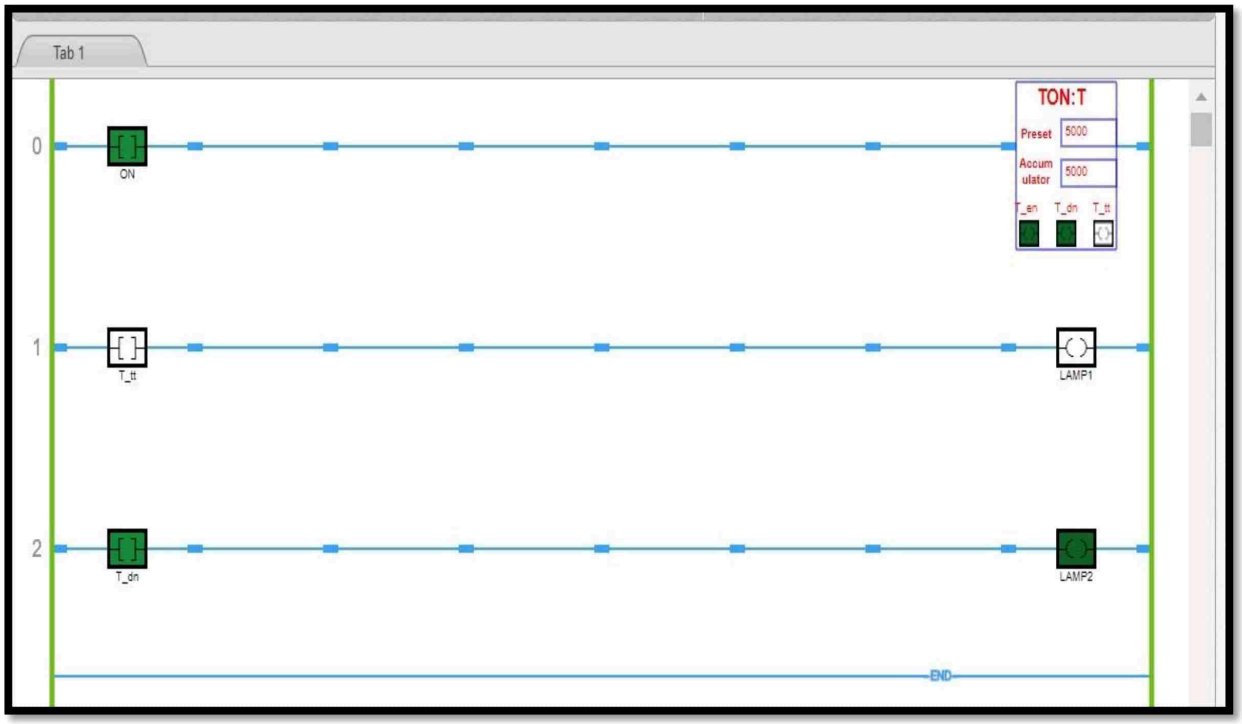



**Figure 2** ON Timer: Preset Value = 5000 Accumulator Value = 5000

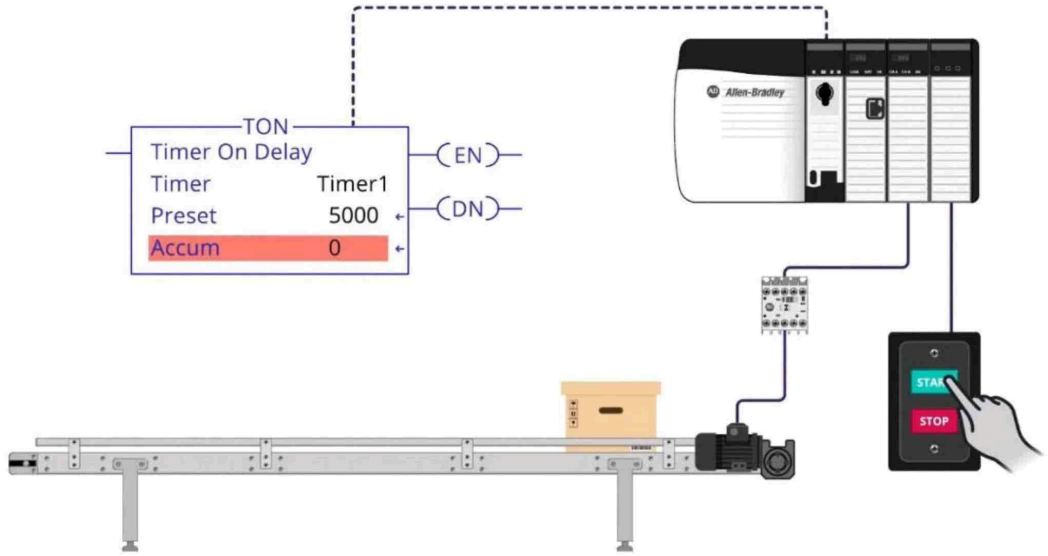


## Output:

**RUNG 0:** Start and Stop Switch is to turn ON/OFF the timer.

**RUNG 1:** When start switch is pressed, along with the timer enable bit timer timing bit also turned ON to show the status of timer's accumulator (ACC) value is currently in running state.

**RUNG 2:** When start switch is pressed, timer starts running from zero to preset valve, timer's done bit is turned ON when accumulator value reached preset value.




## Applications:

On-delay timers are used a lot in PLC programs and in many different ways. For example, an on-delay timer can be used on a conveyor's start button. The timer could be set up so that the start button would need to be pushed and held for five seconds before the conveyor would start.

## Conclusion:

An on-delay timer (TON) is a programming instruction which use to start momentary pulses for a set period.

- The instruction mainly includes three status bits namely EN, TT, DN. Their significance is as follows:

- Enable (EN) Bit: - The enable bit indicates the TON instruction is enabled
- Timer-Timing (TT) Bit: - The timing bit indicates that a timing operation is in process.
- Done (DN) Bit: - The done bit changes state whenever the accumulated value reaches the preset value.
- Accumulator (ACC) Bit: - The accumulated value specifies the number of milliseconds that have elapsed since the TON instruction was enabled.
- Preset (PRE) Bit: - The preset value specifies the value (1msec units) which the accumulated value must reach before the instruction sets the DN bit.
- PLC Timers and Counters are frequently used in industries for time delays and production monitoring. There are situations when we need to turn OFF a certain machine for example a Motor after some time, or we need to turn ON a machine after a certain delay when a sensor is activated, or a button is pressed.

## Implementation of OFF-Delay Timer:

**Figure 3 OFF Delay Timer:**
**Preset=5000 Accumulator = 0**

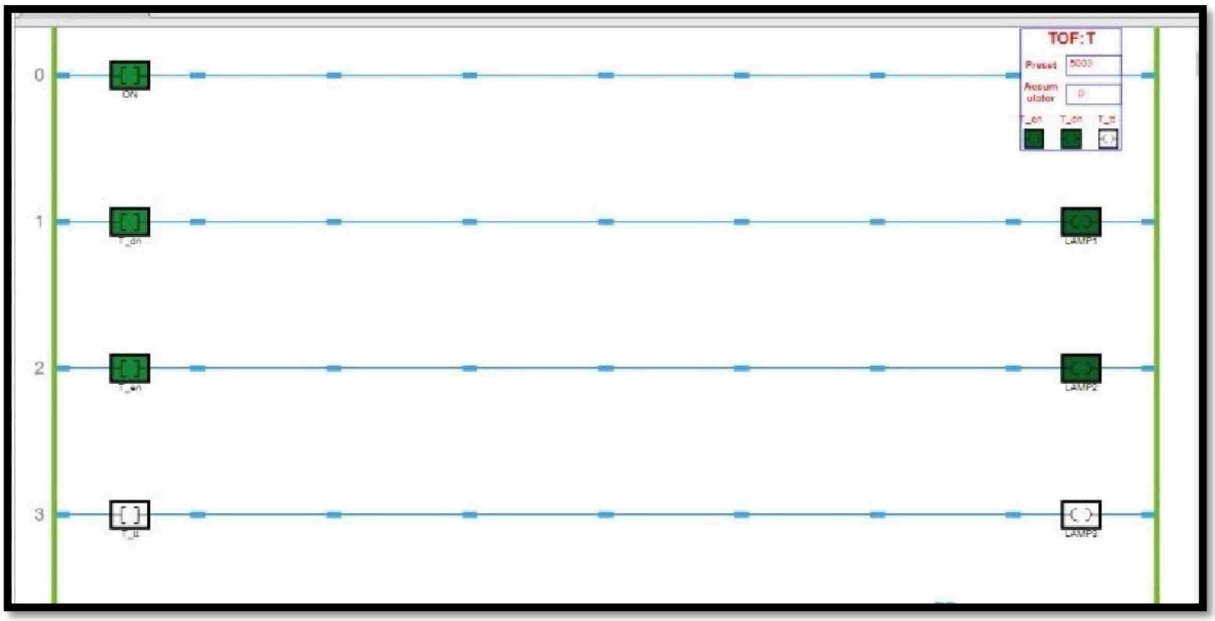
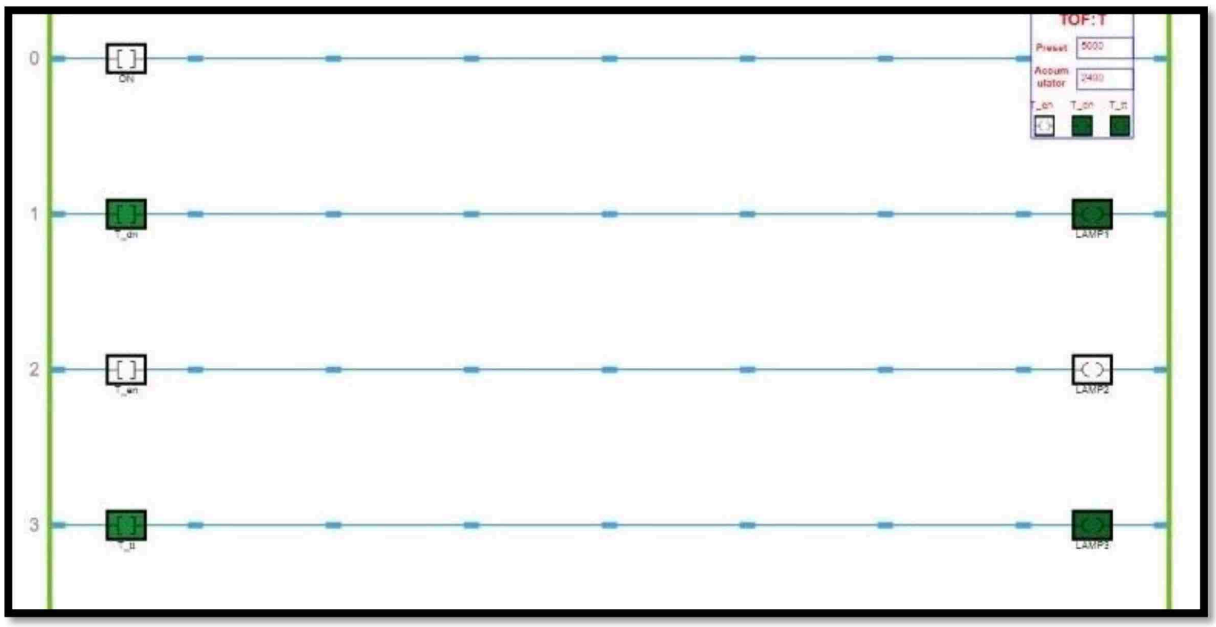


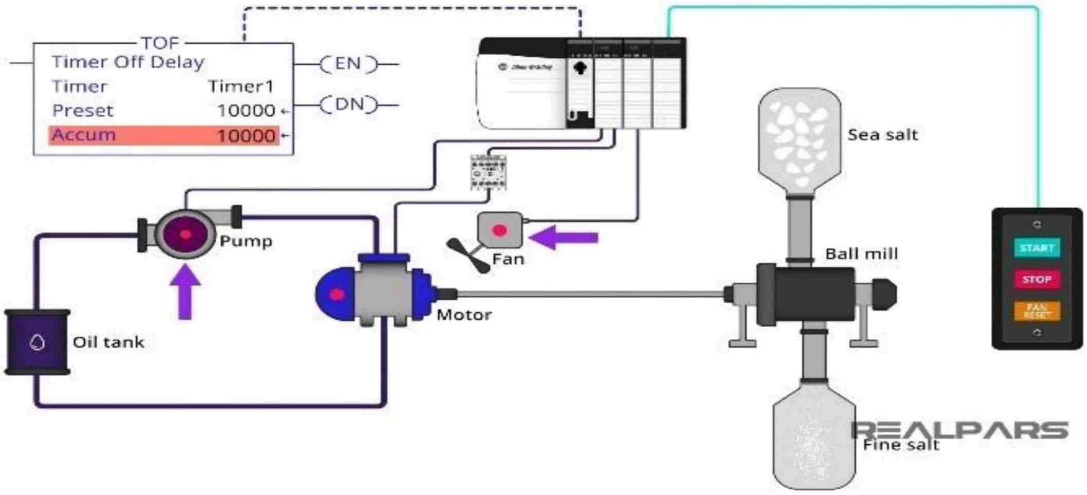
**Figure 4 OFF Delay Timer Preset=5000 Accumulator= 2400**




## Output:

- **RUNG 0:** Start/ Stop Switch is to turn ON/OFF the timer.
- **RUNG 1:** Then start switch is pressed, Timer Enable bit (EN) is turned ON to show the status of TIMER ON/OFF condition along with timer done bit (DN)
- **RUNG 2:** When Start/Stop switch is Turned OFF, timer enable bit, timer timing bit turned OFF to show the status of timer. Timer Timing bit turned ON to show the status of timer is running. Time done bit maintain its previous state.
- **RUNG 3:** If accumulator value reaches preset value, all the timer bits (EN,TT & DN) are turned off.

**Application:** Off-delay timers are used when we are required to allow a device to run longer than anything else. For example, cooling fans and pumps might continue to run after a machine pauses from doing work.




**OFF Delay timers** are often used in sequential logic in which the machine moves from state to state with each new state established with the start contact of a seal circuit. The timer is useful to provide a time buffer between steps. Timers are necessary in this type of program since the machine should be set to move smoothly from action to action. If no time delay is provided between steps, the machine appears to travel in a jerky manner. Many machines will not function well for long without the timer to allow a slight delay between steps.

**Conclusion :** The off-delay timer operates such that when the rung containing the timer is false, the timed output becomes true after some time which will deactivate the output connected after the timer hence, the timer is said to have an off delay. The length of the time delay can be adjusted by changing the preset value.

A TOFF Delay timer has three status bits which are:

1. Timer-Timing (TT) Bit: Off when accumulator reaches preset value.
2. Enable Bit (EN): On when start switch is pressed. Off when start switch is turned off to show the status of the timer. Off when accumulator reaches preset value.
3. Done (DN) Bit: Off when accumulator reaches preset value.

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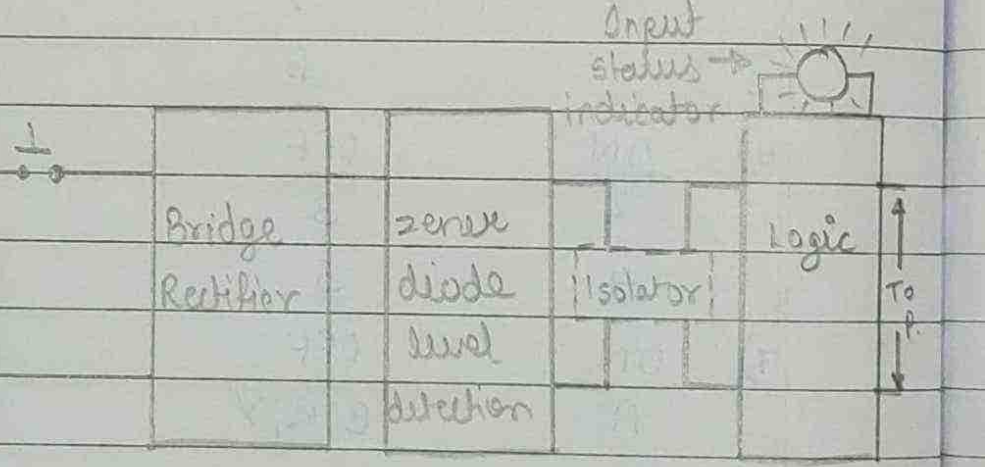
# Sensors and Automation
## Assignment No: 7

Q1. Explain PLC input and output module.

Answer Input and output module in PLC
Input carry signals from the field to the controller various types of inputs can be switches, pressure sensors, transmitters etc. The field devices, to whom PLC sends the results of logical operations are outputs devices. These are the attuators that adjusts or control the process, motors, lights, relays, pumps etc. Many types of outputs can be connected to a PLC and they can be categorised mainly as analog and digital., Analog inputs and outputs change continuously with reference to time.




• Input Module •

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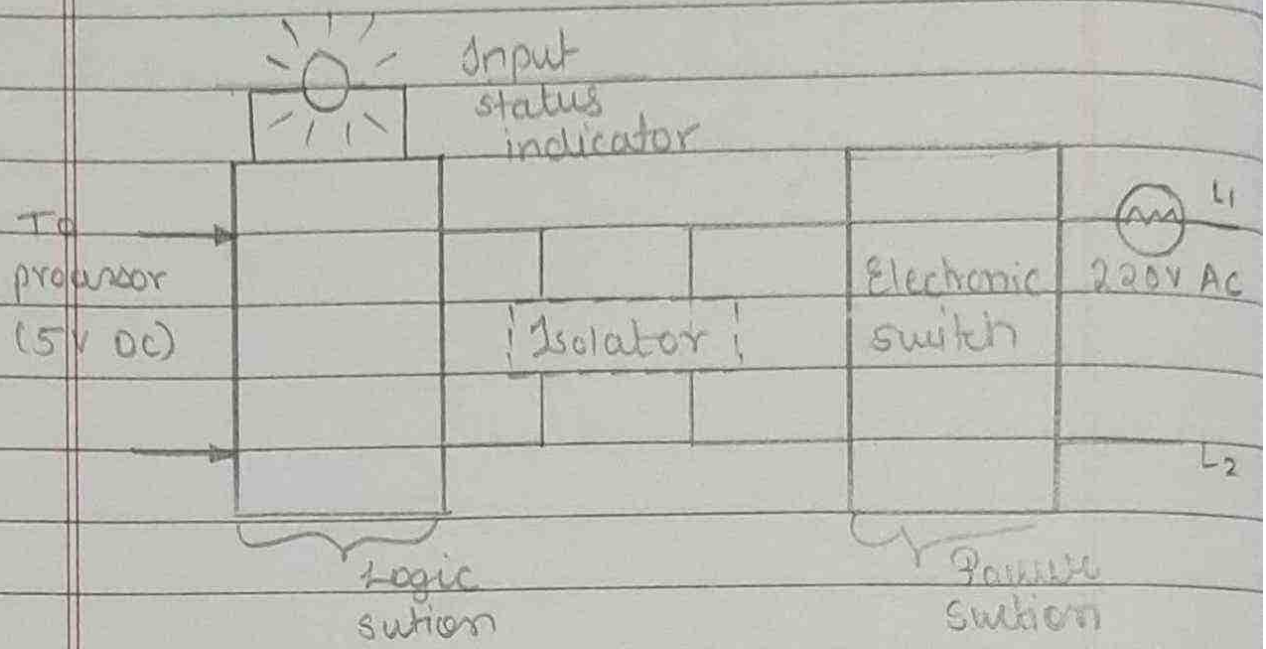
- Examples: Start and stop push buttons, sensors, limited, switch, selector switch.



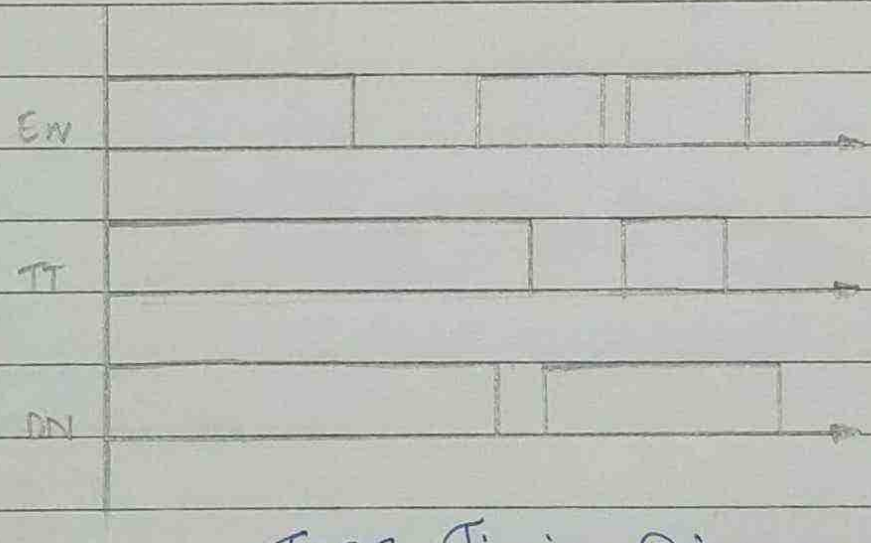

## • Output Modules •

Examples:

Electric heater, lights, solenoid valve, relays, butter, fan

Q2.

Answer.




TOFF Timing Diagram

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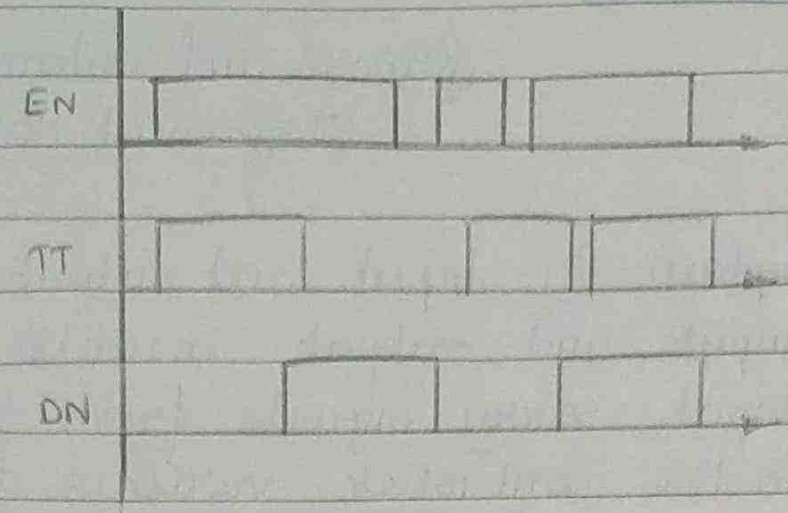


TON Timing Diagram

Q3.

Answer 1) 0 seconds

2) 10 seconds

3) 10 seconds

4)

| True | False |
|---|---|
| LS1 | 2 |
| 4 | 3 |
| 5 | |

5)

| ON | OFF |
|---|---|
| R | A |
| | Y |
| | B |

6)

| ON | OFF |
|---|---|
| 2 | 3 |
| 4 | 5 |

7)

| ON | OFF |
|---|---|
| A | B, R, Y |

8) 0