بسم الله الرحمن الرحيم

PLC Course

مقرر الحاكمات المنطقية المبرمجة

Lec 5

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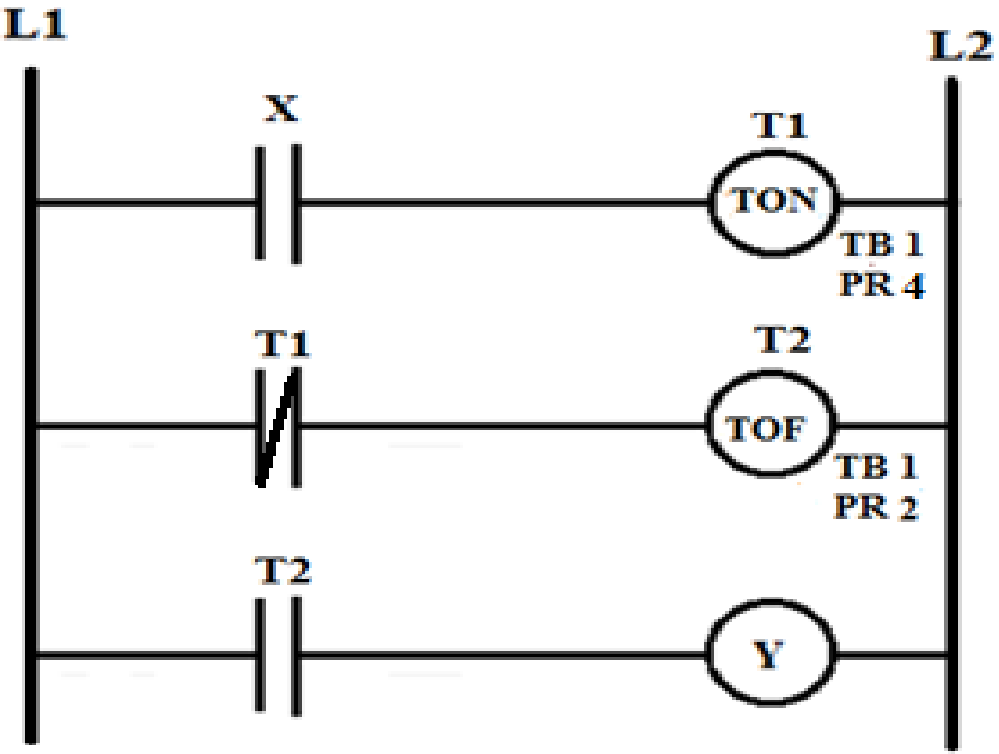
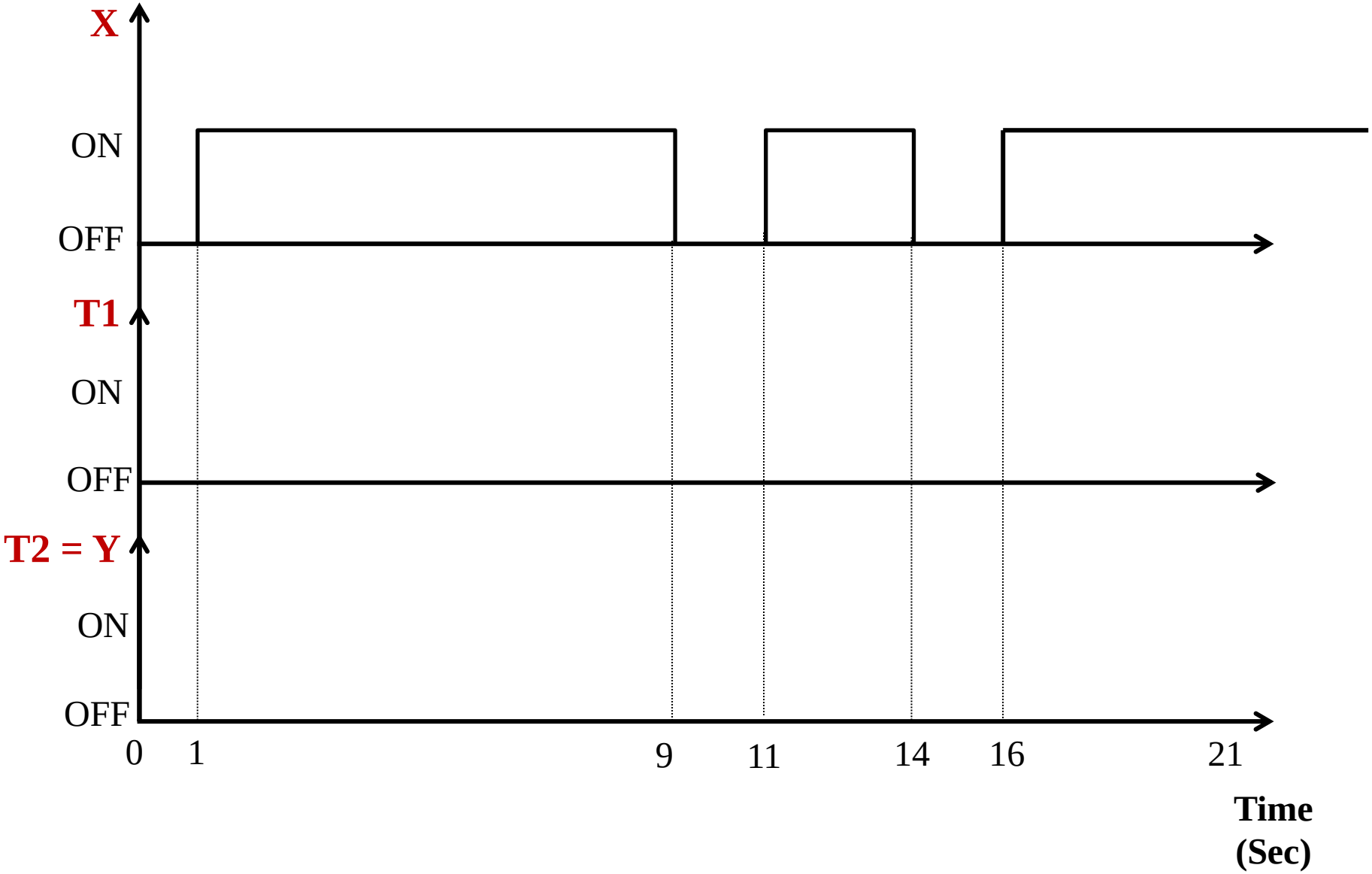
16/3/2024

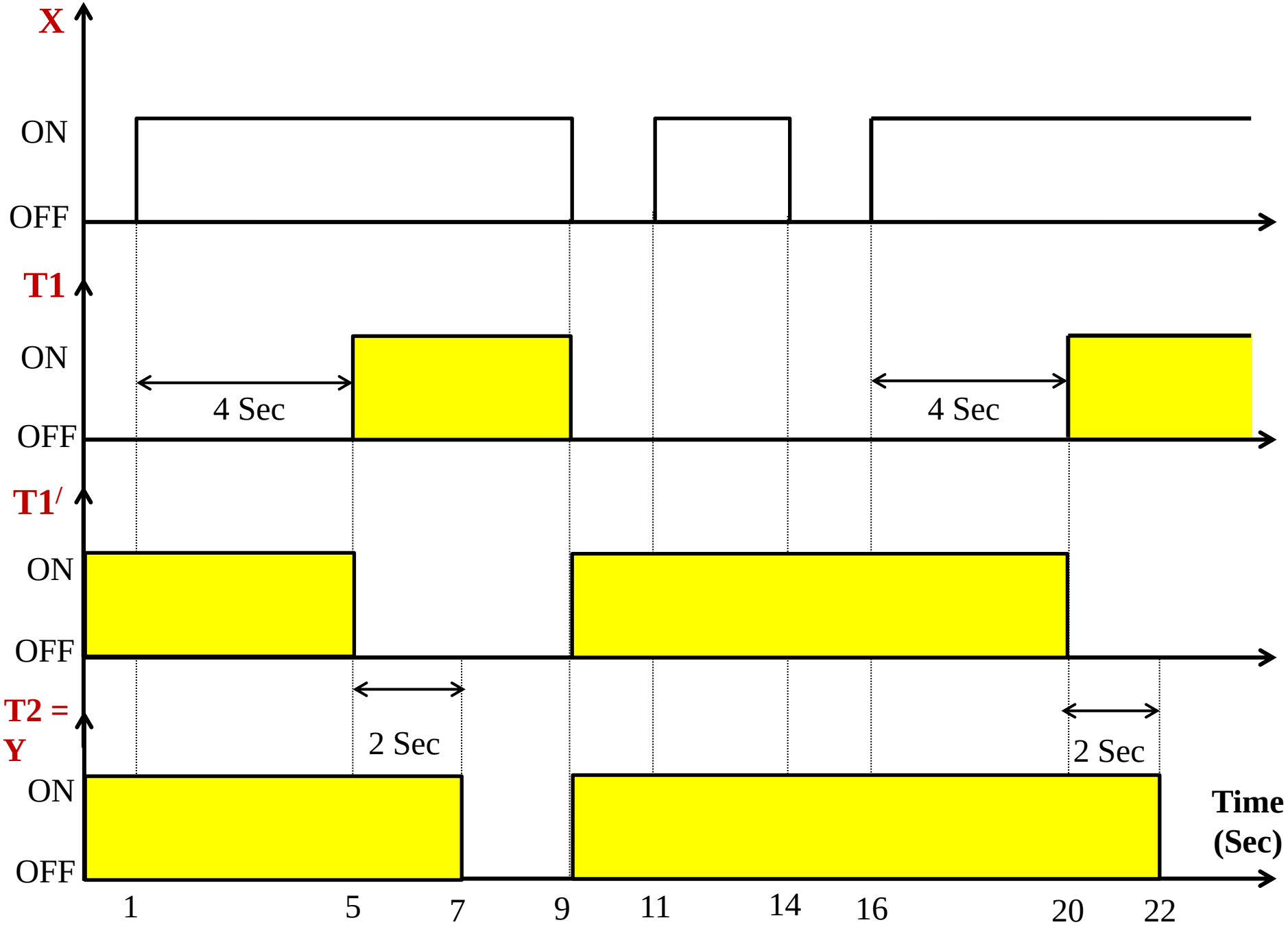
EX1:

- For the following diagram:



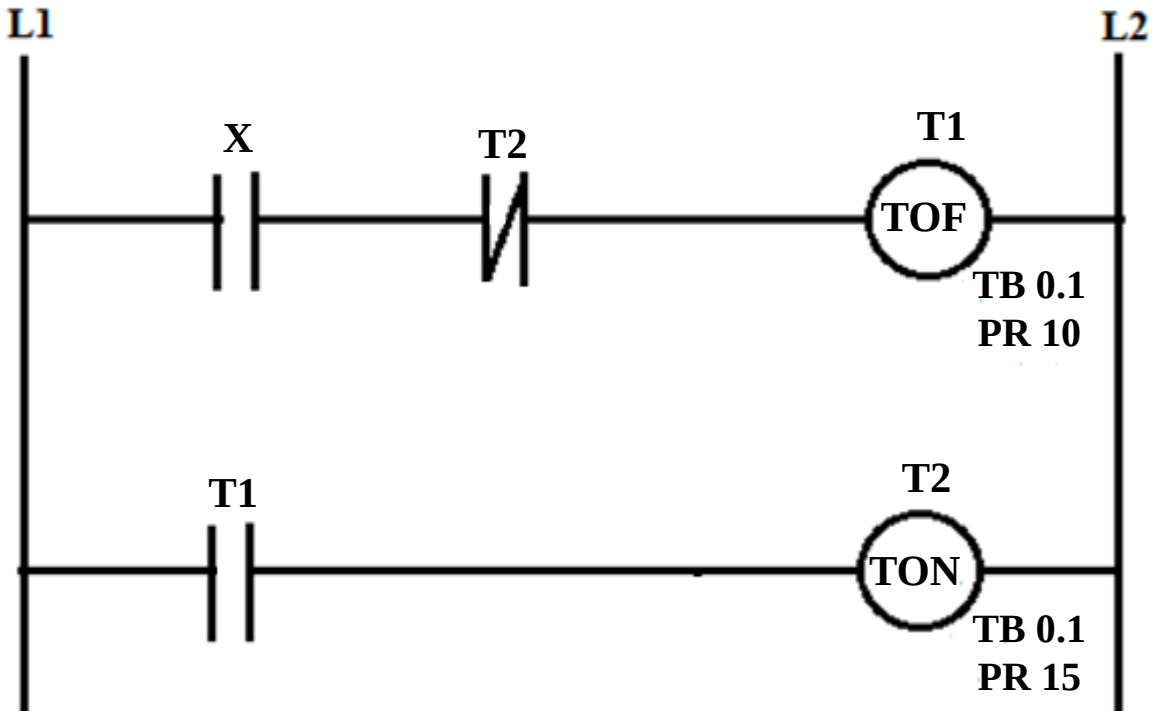
- Using timing diagram, illustrate the states of T1, T2 and Y for the following state of the input switch X:


X
ON
OFF
T1
ON
OFF
T2 = Y
ON
OFF
0
1
9
11
14
16
21
Time
(Sec)

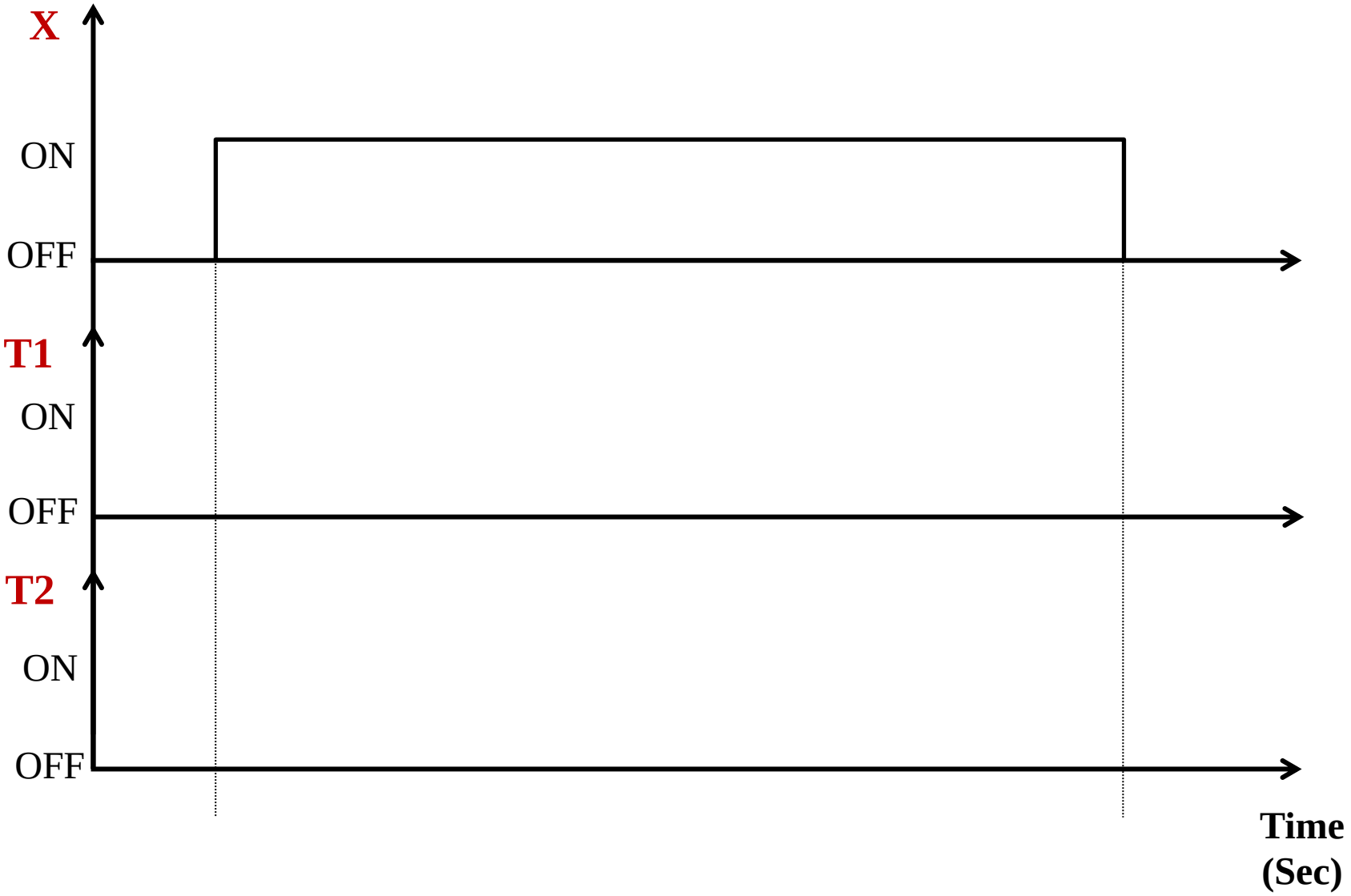

X
ON
OFF
T1
ON
OFF
4 Sec
4 Sec
T1/
ON
OFF
T2 = Y
2 Sec
2 Sec
ON
OFF
Time (Sec)
1
5
7
9
11
14
16
20
22

EX2:

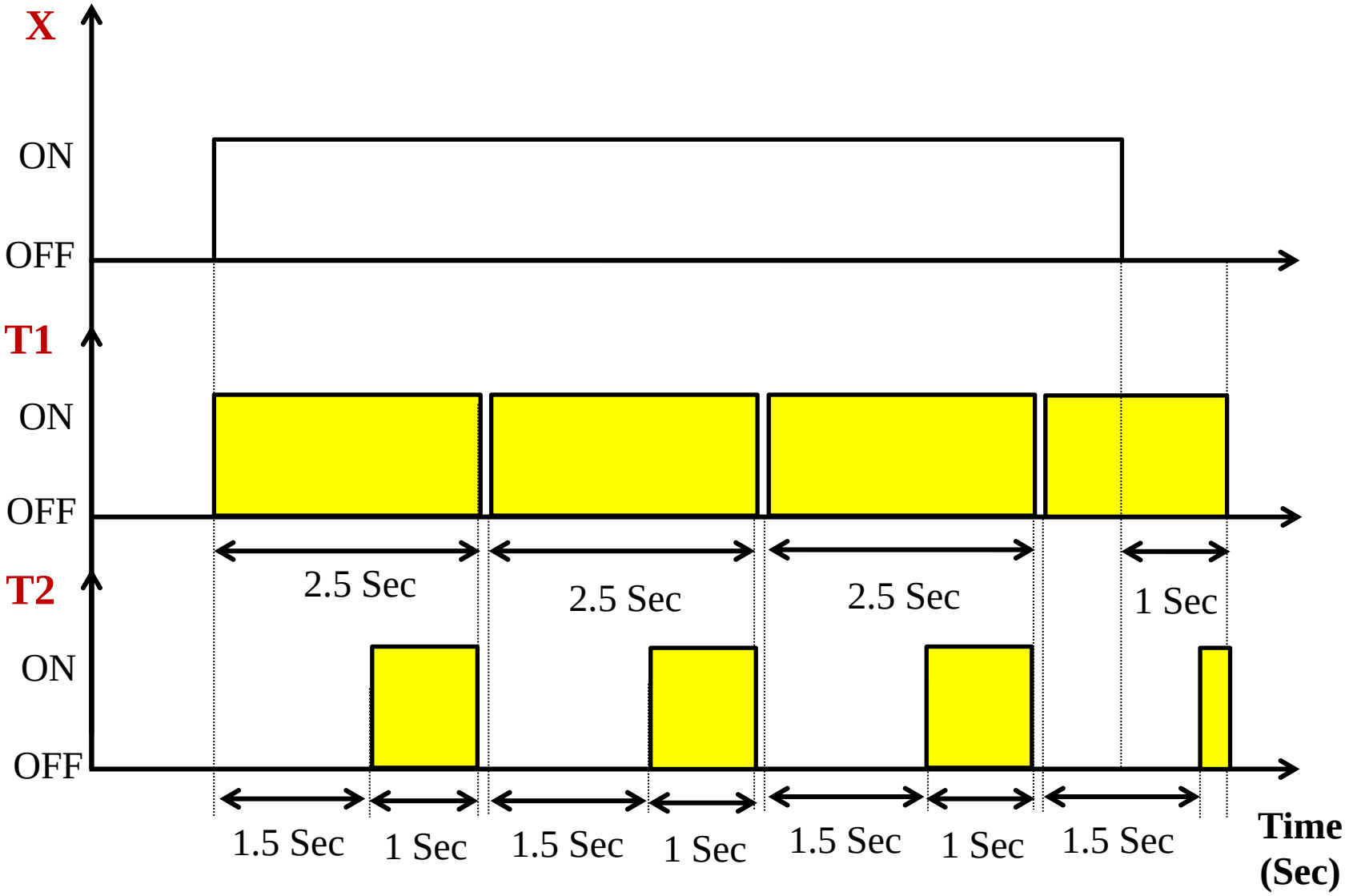
- For the following diagram:



- Using timing diagram, illustrate the states of T1 and T2 for the following state of the input switch X:



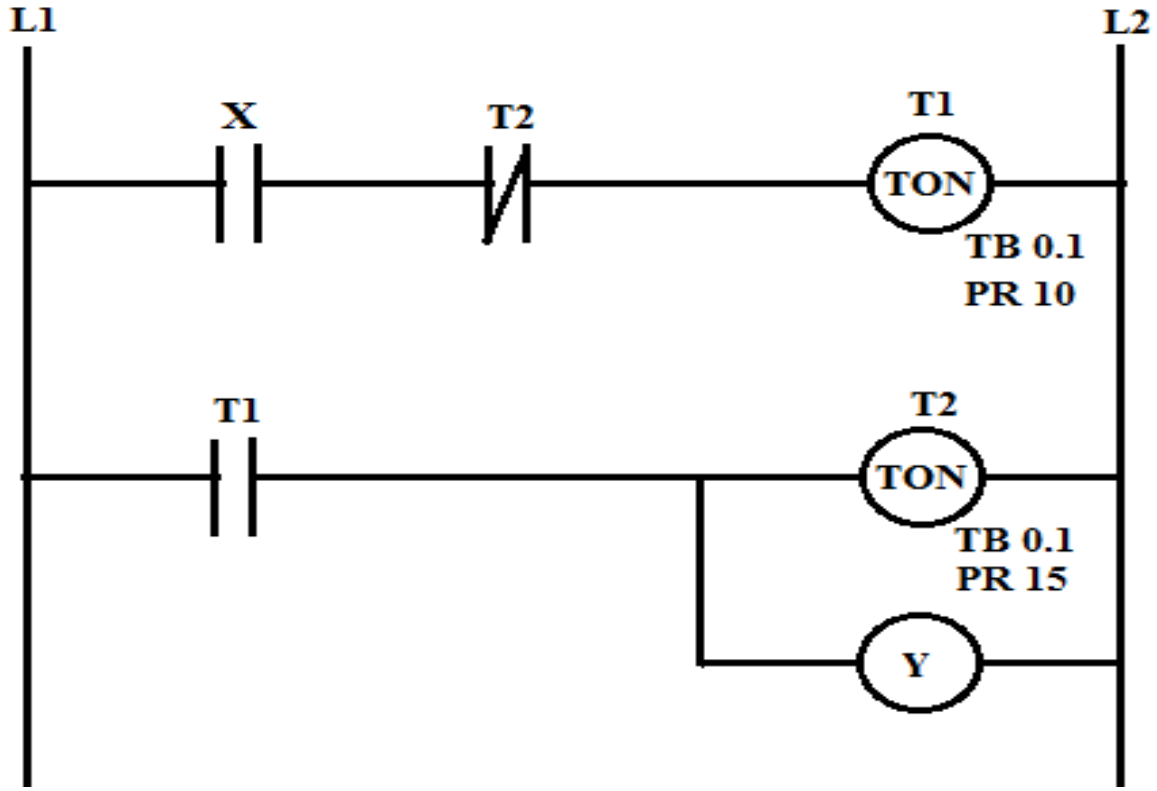
Timing Diagram



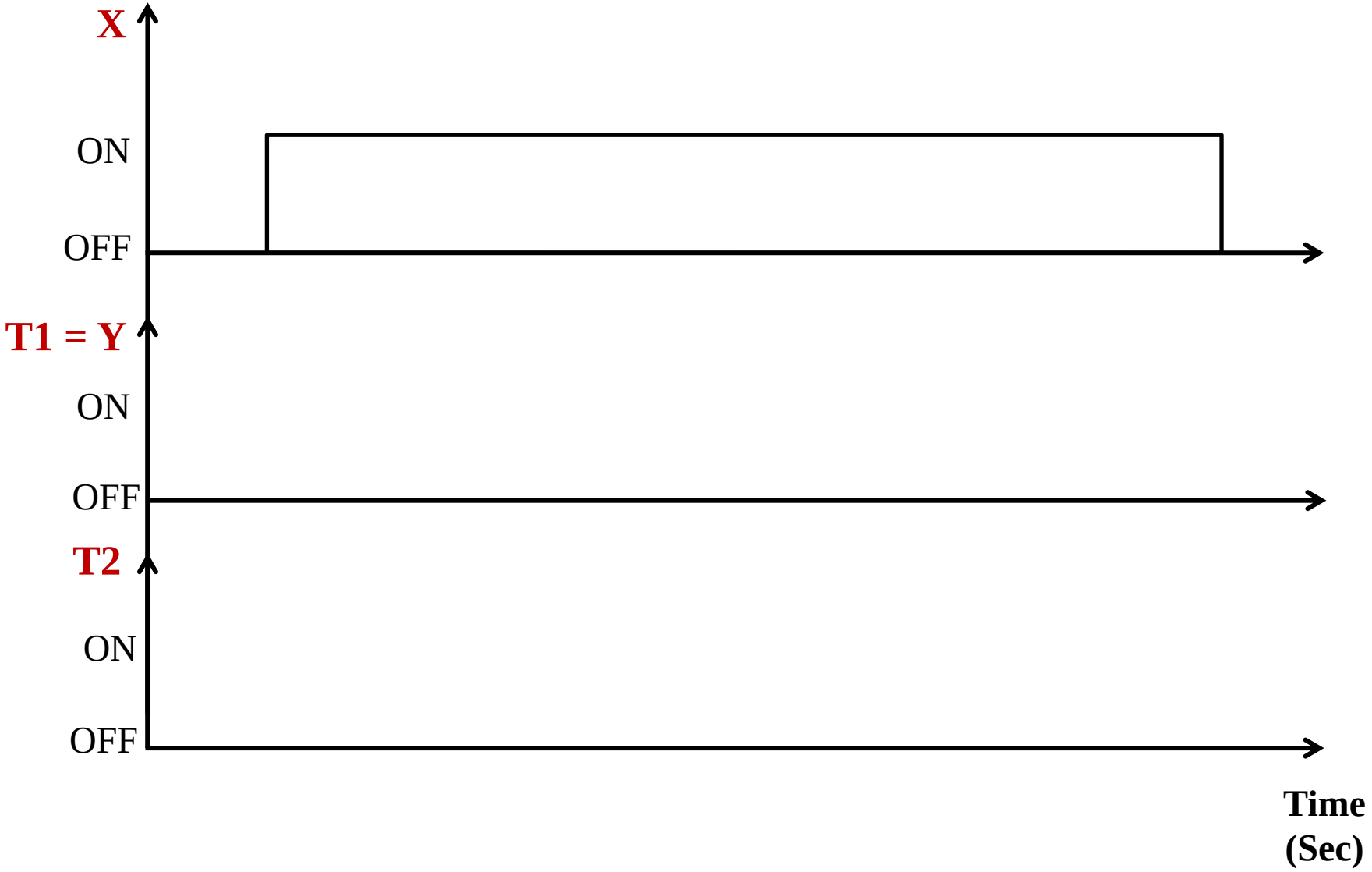
Timing Diagram

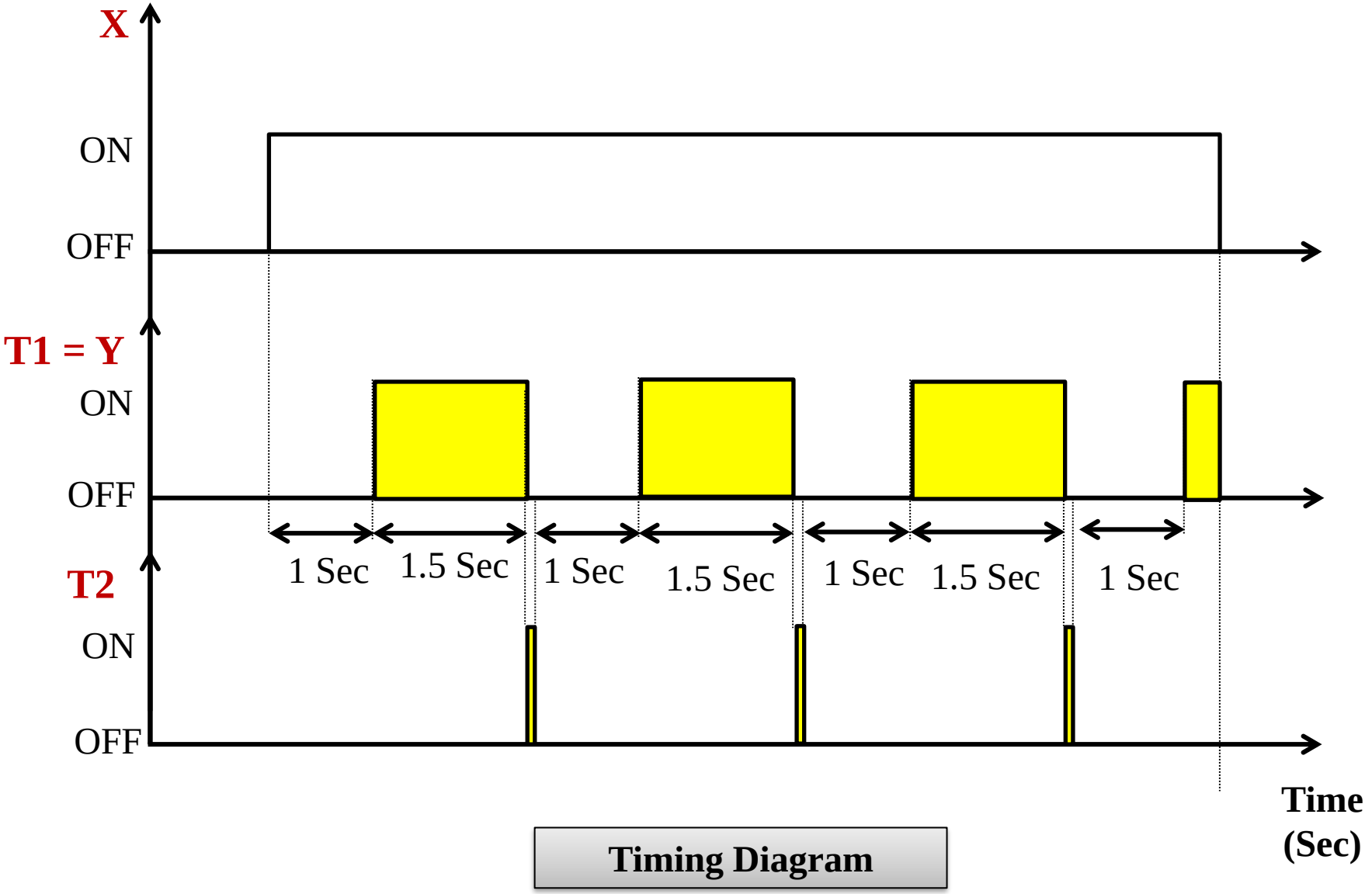
EX3:

- For the following diagram:



- Using timing diagram, illustrate the states of T1, T2 and Y for the following state of the input switch X:

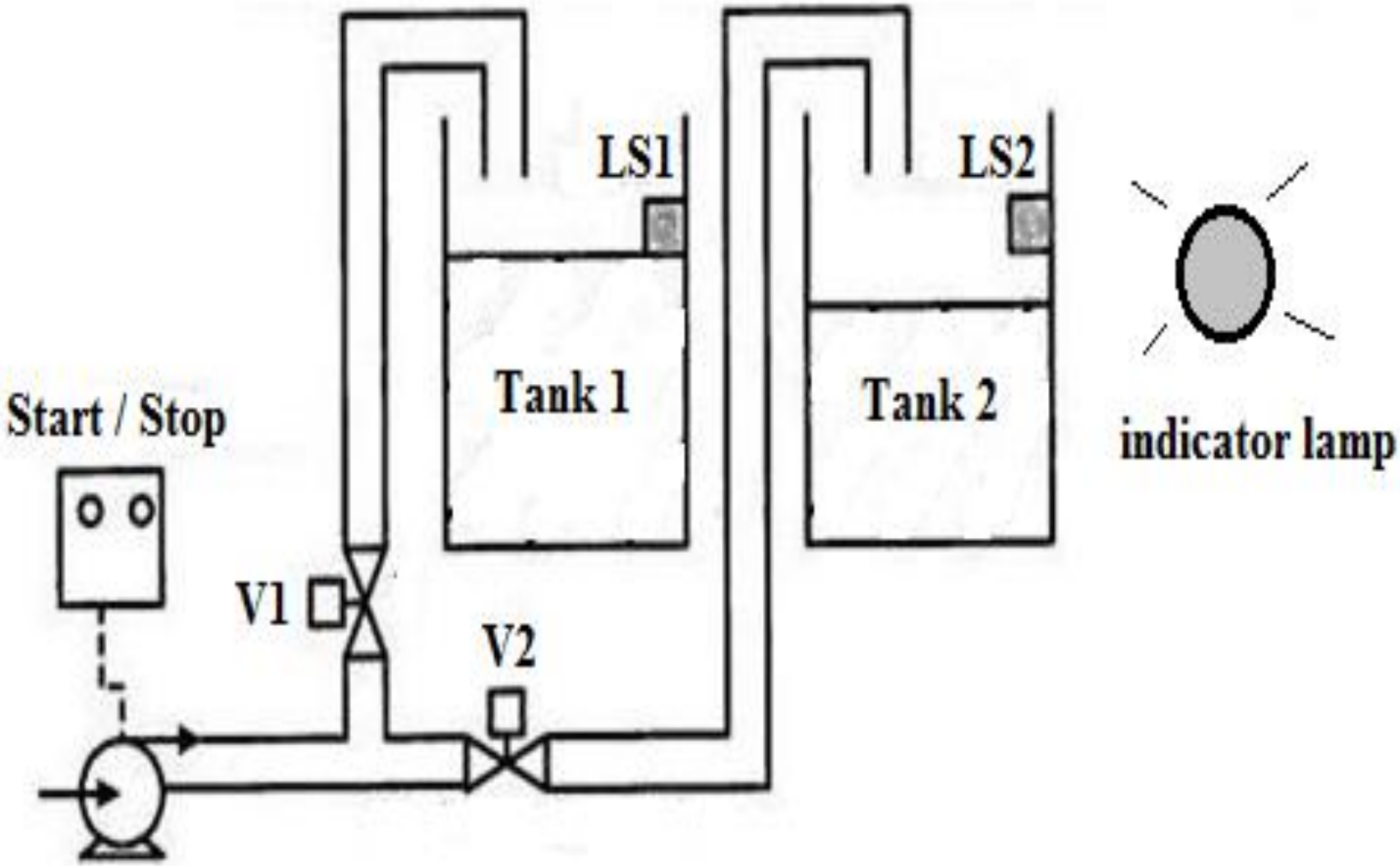

X
ON
OFF
T1 = Y
ON
OFF
T2
ON
OFF
Time
(Sec)



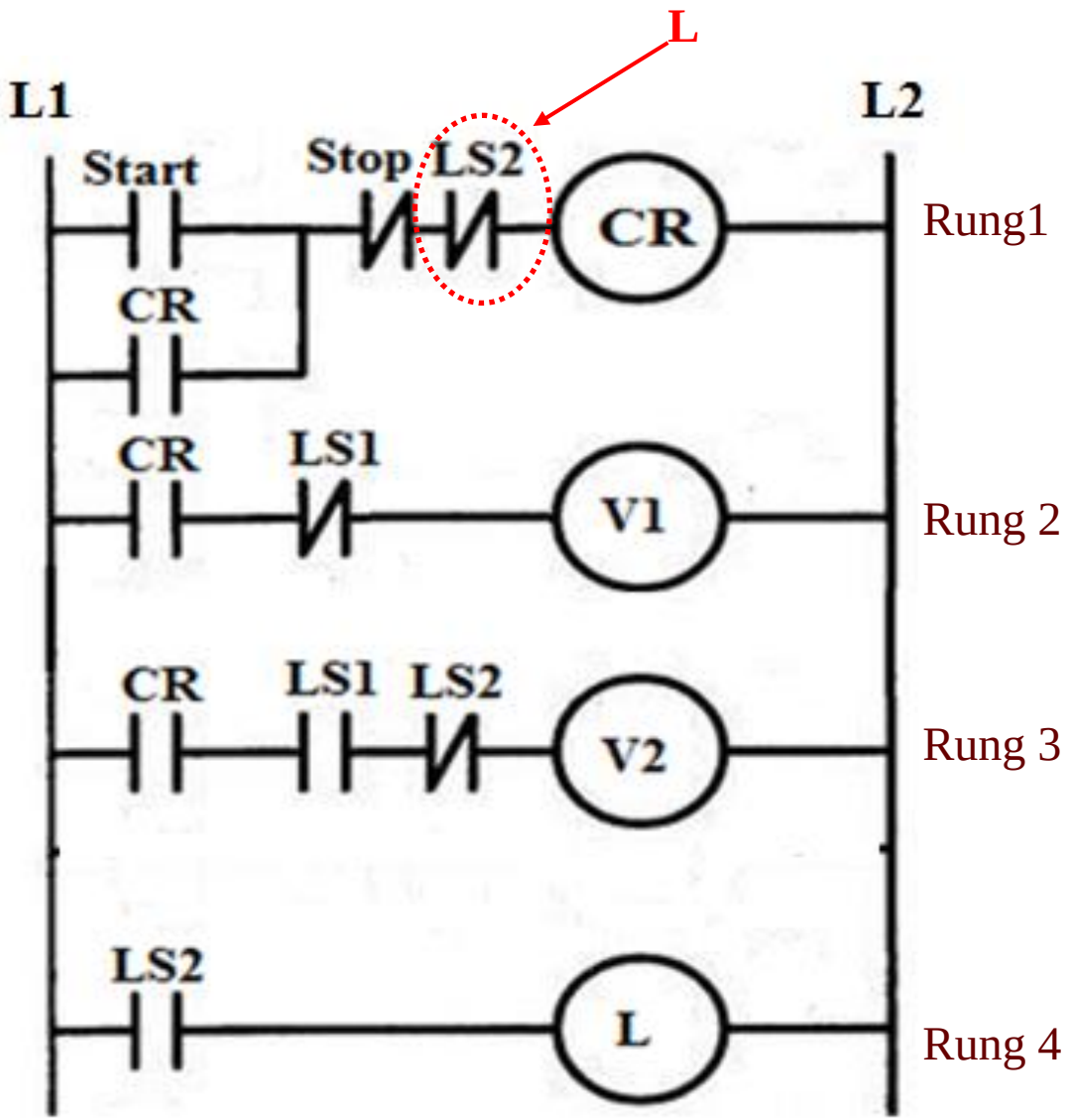
Timing Diagram

EX4: Level Control

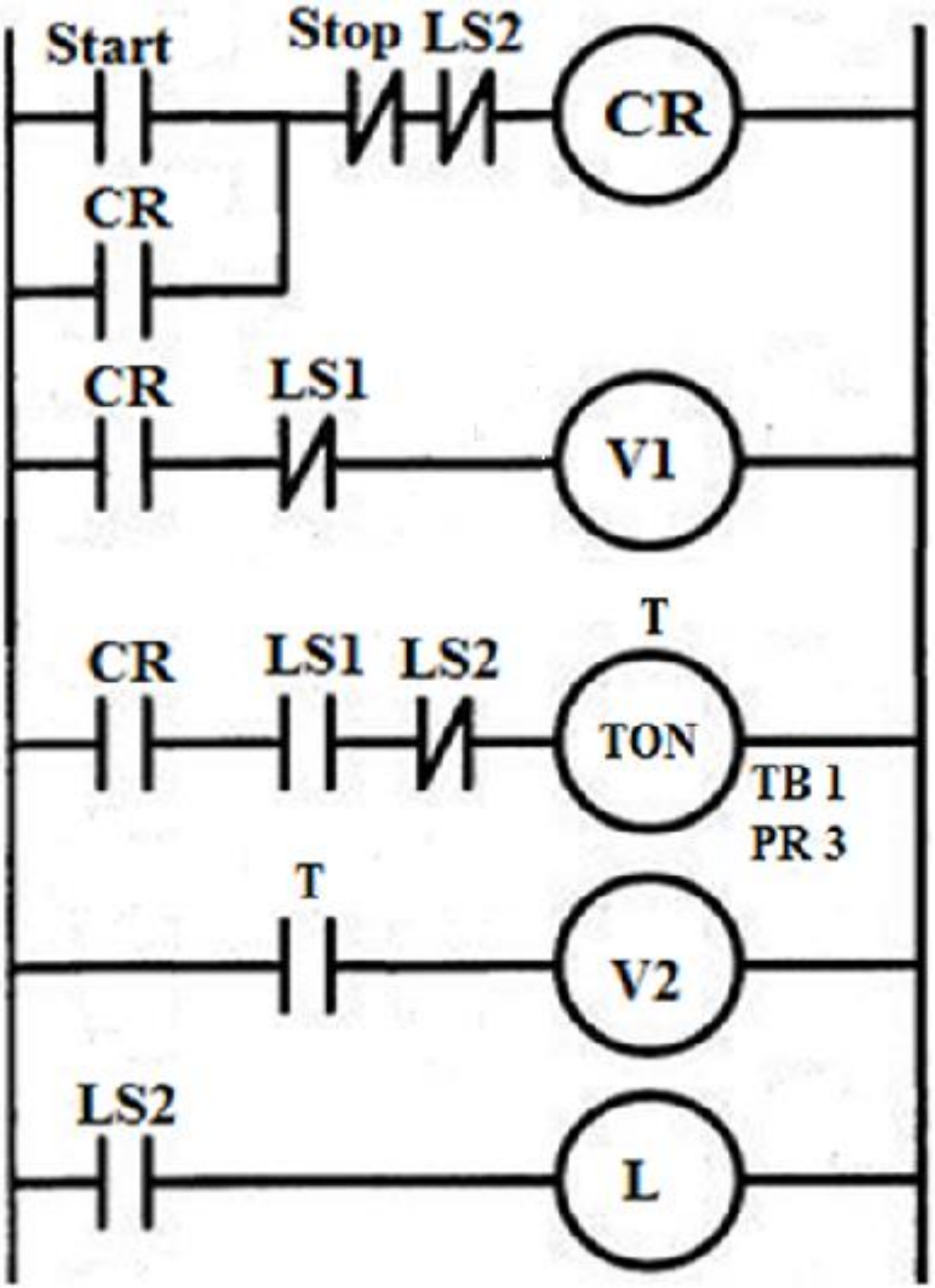
- Write a ladder diagram program for the following system shown in the following figure. we want to fill tank1 and tank2 with water by the following sequence: When start switch is pressed, the valve (**V1**) opens to fill tank1 with water until it reaches to the desired level (via floating switch **LS1**).
- The valve (**V2**) waits 3 Sec, and then it opens to fill tank2 with water until it reaches to the desired level (via floating switch **LS2**).
- When tank2 is full, the system stops automatically, and an indicator lamp (**L**) is turned on to show that the process of filling the two tanks is ended.
- There exists a stop switch to end the process at any emergency time.


LS1
LS2
Tank 1
Tank 2
Start / Stop
V1
V2
indicator lamp

- Remember, we have already solved this example before without using timer as:



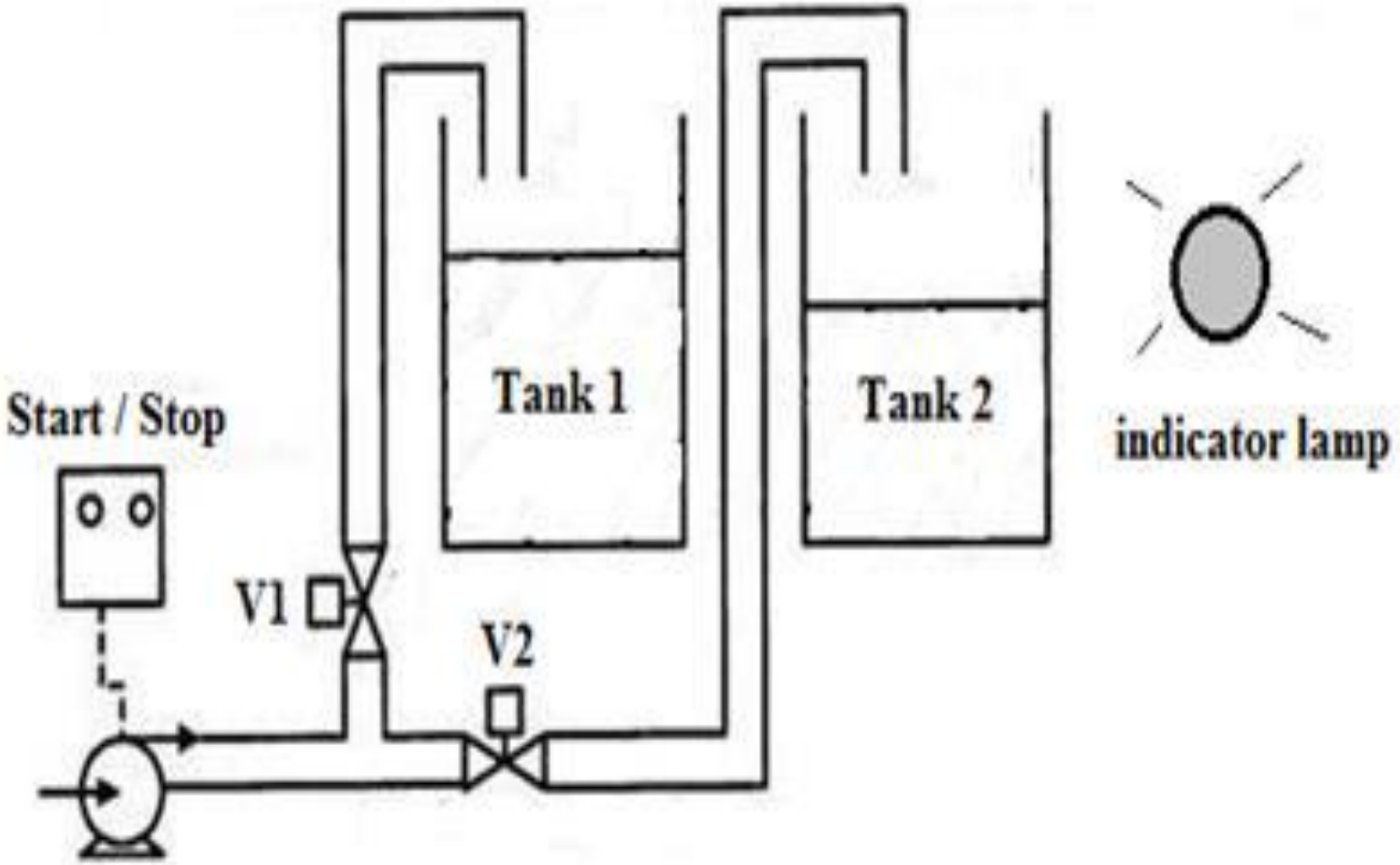
Solution using timer



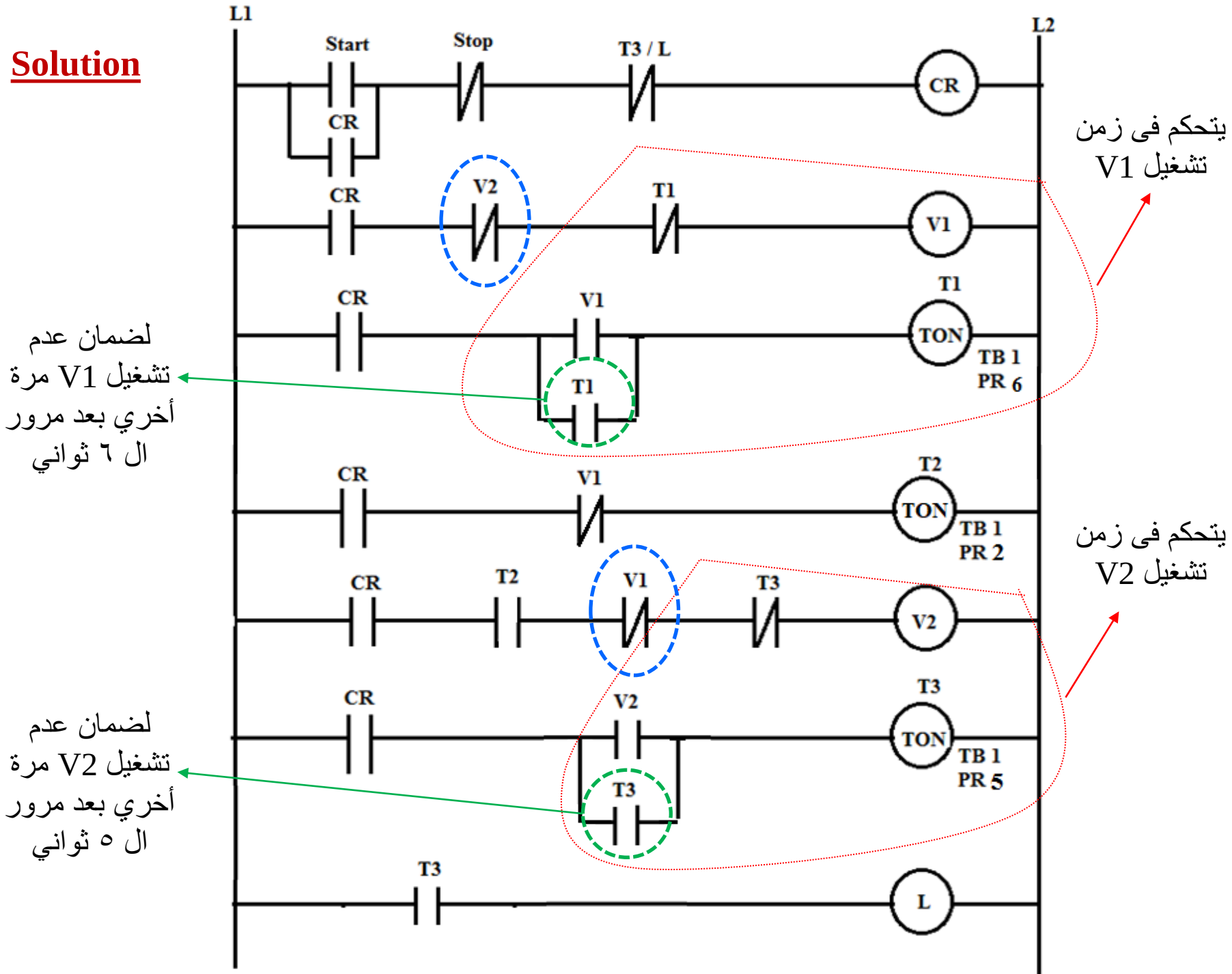
EX5: Level Control

In the following figure we want to fill tank1 and tank2 with water by the following sequence:

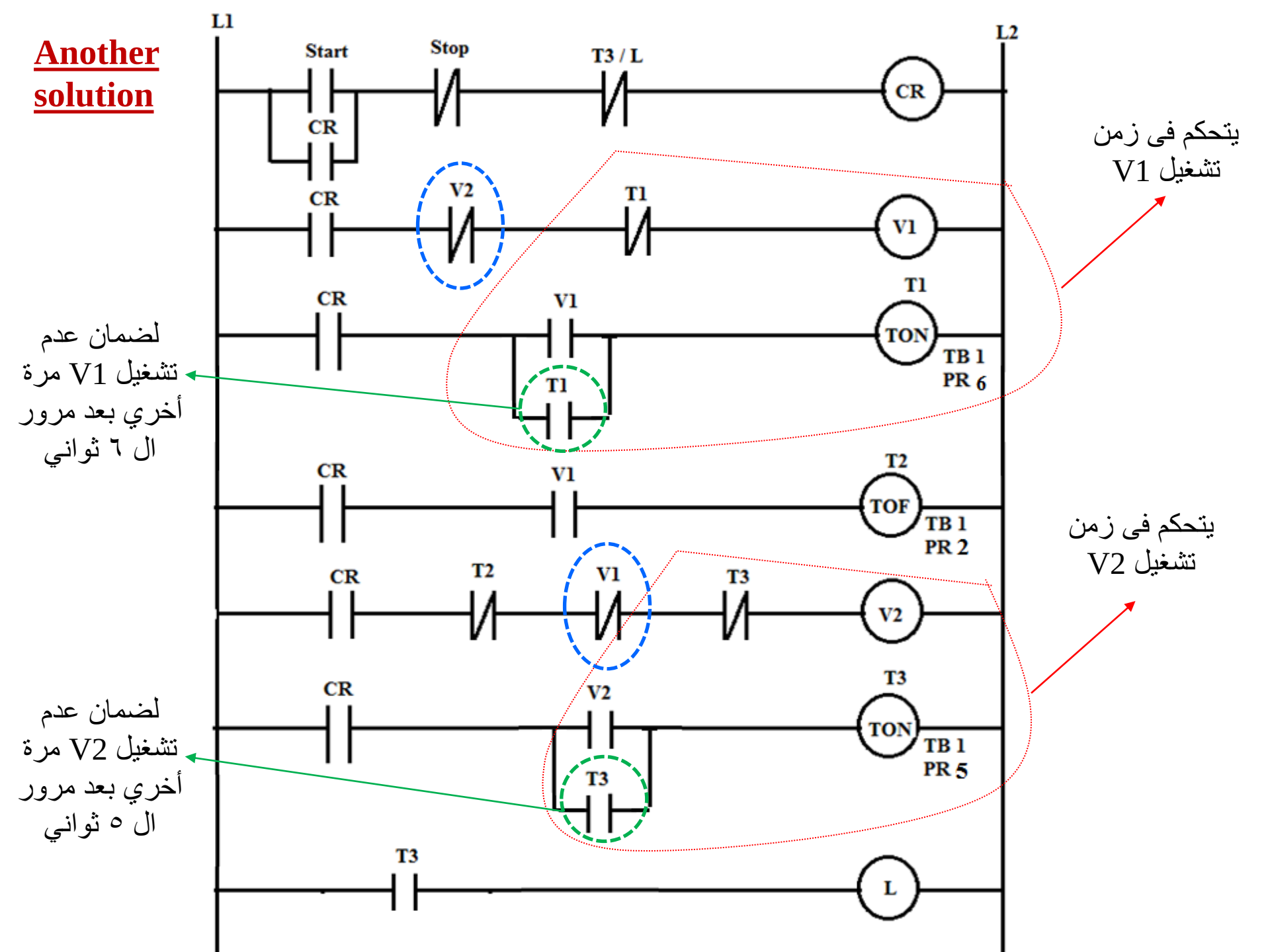
- When start switch is pressed, the valve (V1) opens to fill tank1 with water. The time required to fill tank1 is 6 Sec.
- After filling tank1, the valve (V2) waits 2 Sec and then it opens to fill tank2 with water. The time required to fill tank2 is 5 Sec.
- When tank2 is full, the system stops automatically, and an indicator lamp (L) is turned on to show that the process of filling the two tanks is ended.
- There exists a stop switch to end the process at any emergency time.


Start / Stop
Tank 1
Tank 2
indicator lamp
V1
V2

Solution


L1
L2
Start
Stop
T3 / L
CR
CR
CR
V2
T1
V1
CR
V1
T1
TON
TB 1
PR 6
T1
CR
V1
T2
TON
TB 1
PR 2
CR
T2
V1
T3
V2
CR
V2
T3
TON
TB 1
PR 5
T3
T3
L
يتحكم فى زمن
تشغيل V1
لضمان عدم
تشغيل V1 مرة
أخري بعد مرور
ال ٦ ثواني
يتحكم فى زمن
تشغيل V2
لضمان عدم
تشغيل V2 مرة
أخري بعد مرور
ال ٥ ثواني

Another solution

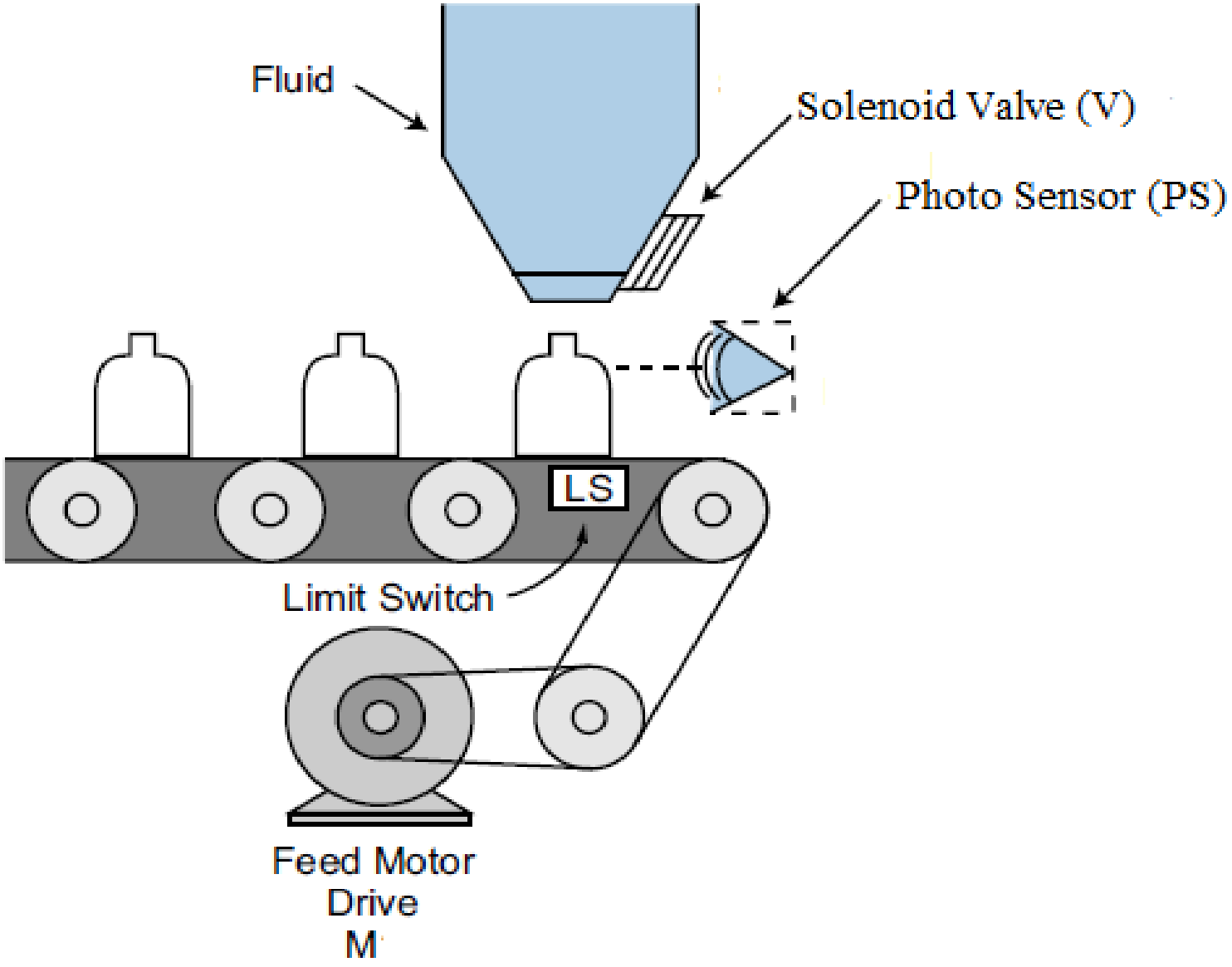


EX6: Production Line

- Draw a suitable ladder diagram program for a production line shown in the following figure. The sequences of its operation as follow:

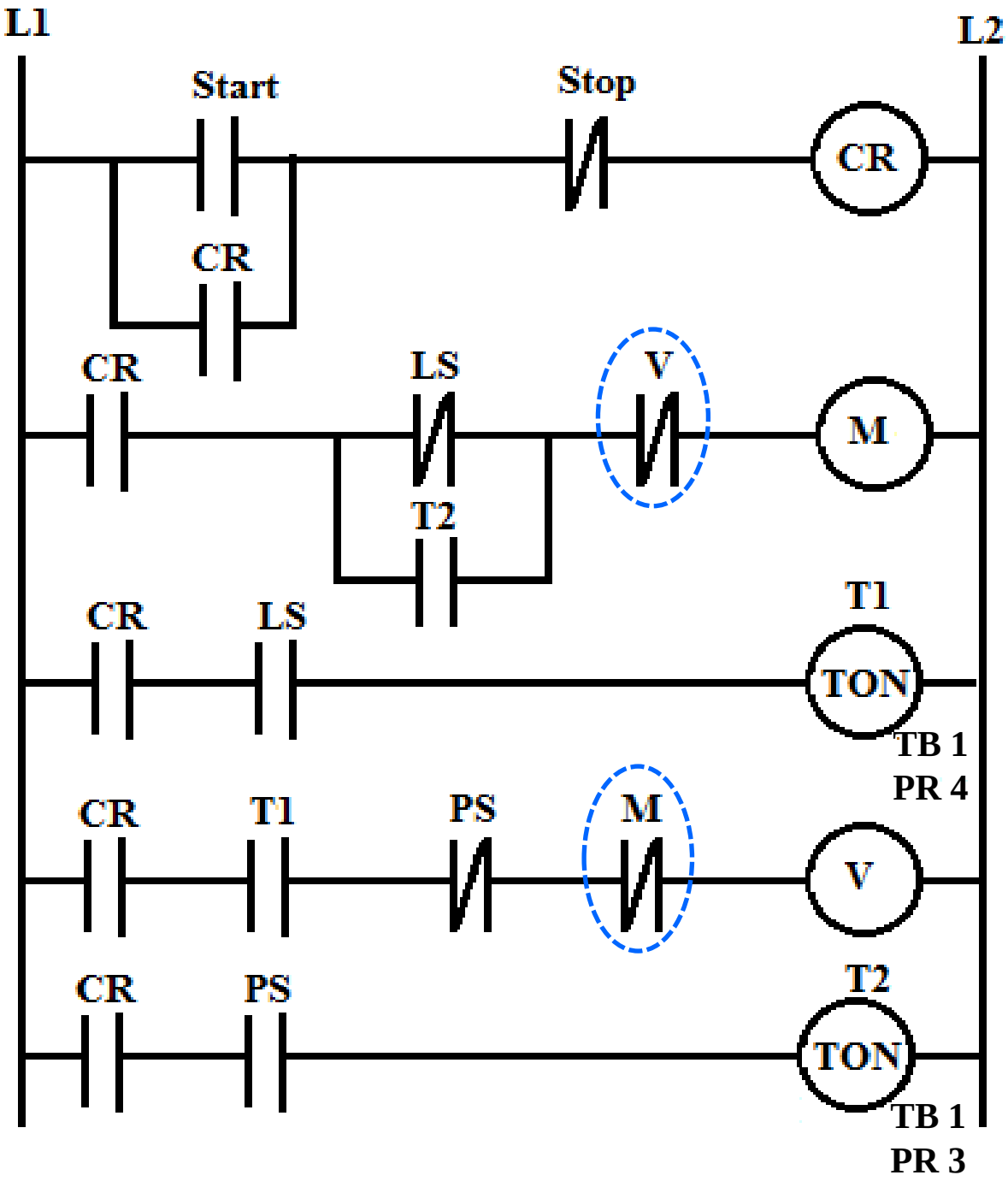
1) It detects the position of a bottle via a limit switch (**LS**), stops the motor (**M**) then, waits 4 sec and then opens the valve (**V**) to fill the bottle until a photo-sensor (**PS**) detects a filled condition.
2) After the bottle is filled, waits 3 sec, then the motor (**M**) moves again to repeat these operations to the next bottle and so on.

- The production line should include start and stop push button switches to start and end these operations.


Fluid
Solenoid Valve (V)
Photo Sensor (PS)
LS
Limit Switch
Feed Motor
Drive
M

- We need the following inputs, outputs and internals:

Label	I/O
Start (NO Push button switch)	Inputs
Stop (NC Push button switch)	
LS	
PS	
M (Motor)	Outputs
V (Valve)	
CR	Internal relay / Internal output
T1 (4 sec TON)	Timers
T2 (3 sec TON)	


L1
L2
Start
Stop
CR
CR
CR
LS
V
M
T2
CR
LS
T1
TON
TB 1
PR 4
CR
T1
PS
M
V
CR
PS
T2
TON
TB 1
PR 3