



INTERNATIONAL UNIVERSITY OF SARAJEVO

SPRING 2015.

EE 436 PROGRAMMABLE LOGIC CONTROLLERS

MID-TERM EXAM

STUDENT NAME: _____

DATE: _____

Instructions:

- Examination time: **90 min.**
- Print your **name** and **student ID number** in the space provided above.
- This examination is **closed book** and closed notes.
- There are 4 questions. The points for each question are given in brackets, next to the question title. The overall maximum score is 100. **This mid-term weighs 25% of your final grade.**
- Answer each question in the space provided. If you need to continue an answer onto the back of the sheet, clearly indicate that and label the continuation with the question number.

QUESTION	1	2	3	4
POINTS	/20	/30	/20	/30
			TOTAL	/100

1. Mark the correct statement(s) (20 %)

- 1.1 All PLCs have absolutely the same and compatible programming software. T / F
- 1.2 Using subroutines saves memory because it is programmed only once and called multiple times during a program execution. T / F
- 1.3 Outputs controlled within a subroutine remain in their last state until the subroutine is executed again. T / F
- 1.4 All PLCs have the capability to perform complex mathematical operations. T / F
- 1.5 It is possible to increase the number of inputs and/or outputs of a typical PLC, using expansion modules. T / F

2. Design a ladder diagram / program (30%)

Design a program that energizes outputs O:0.0/0 through O:0.0/4 when the input from analog channel 0 (i.e. I:1.0) is in the ranges [0,1000], [1001,2000], [2001, 3000], [3001, 4000], [4001, 5000] respectively. O:0.0/5 should flash continuously at the rate of ten times per second for any input value above 5000. Hint: Use the LIM function.

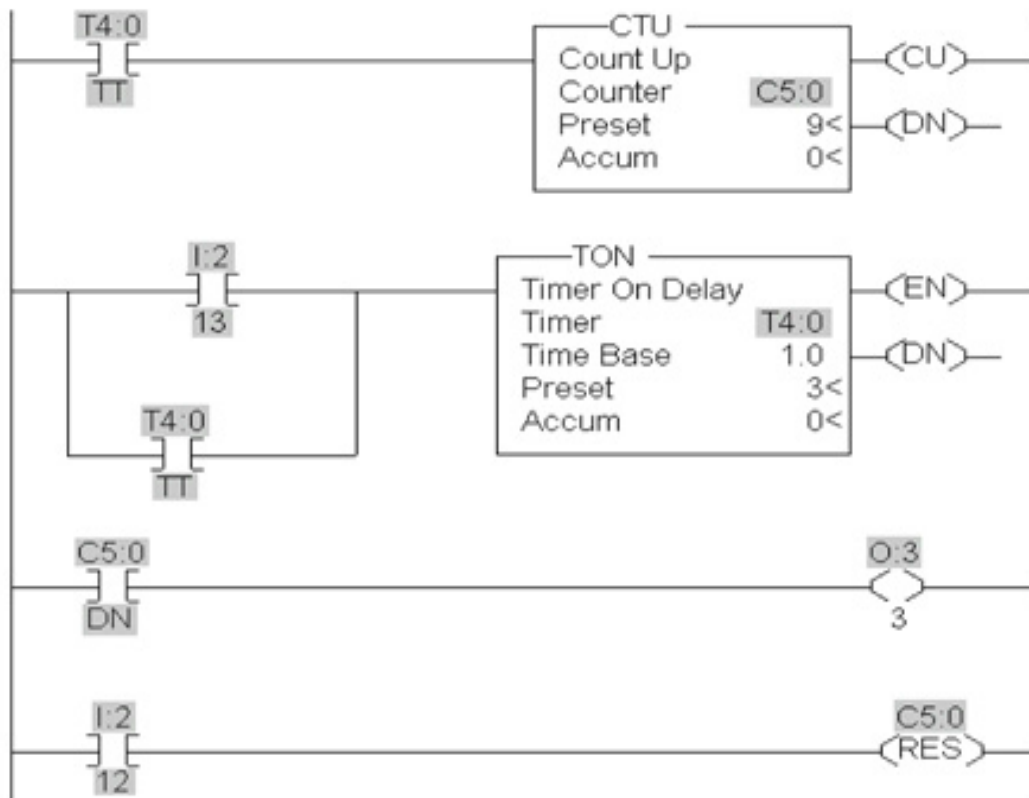
3. Instrumentation (20%)

- 3.1 List 4 discrete input devices, 4 analog input devices, 2 discrete output devices and 2 analog output devices that can be connected to a PLC!
- 3.2 Name a few standard analog input signals (ranges 0-100% of measured value).
- 3.3 Why are current analog signals used in most cases, rather than voltage analog signals.
- 3.4 List at least three PLC producers!
- 3.5 State at least five PLC commands/operations and explain what they do.

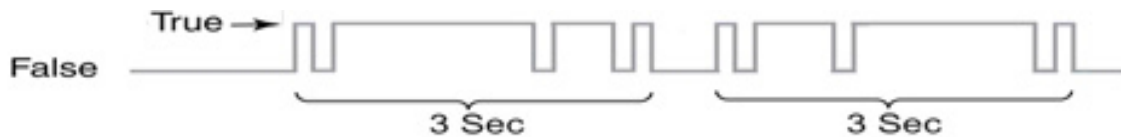
4. Analyze ladder diagram / program

(30%)

Explain what the program does, rung by rung, and what the overall function of the program is.



The waveform below is the action of the sensor that is addressed by I:2/13.



The total time of the wave form at the input is 6.5 seconds. What is the state of O:3/3, what is the ACC value of the counter, and what is the ACC value of the timer at:

- a) t=5 seconds
- b) t=6.5 seconds