



INTERNATIONAL UNIVERSITY OF SARAJEVO

SPRING 2017

EE 436 PROGRAMMABLE LOGIC CONTROLLERS

MID-TERM EXAM

STUDENT NAME: _____

DATE: _____

Instructions:

- Examination time: **80 min.**
- Print your **name** and **student ID number** in the space provided above.
- This examination is **closed book** and **closed notes**.
- There are 3 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 20% 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
POINTS	/24	/26	/50
		TOTAL	/100

1. Mark the correct statement(s)

(24 %)

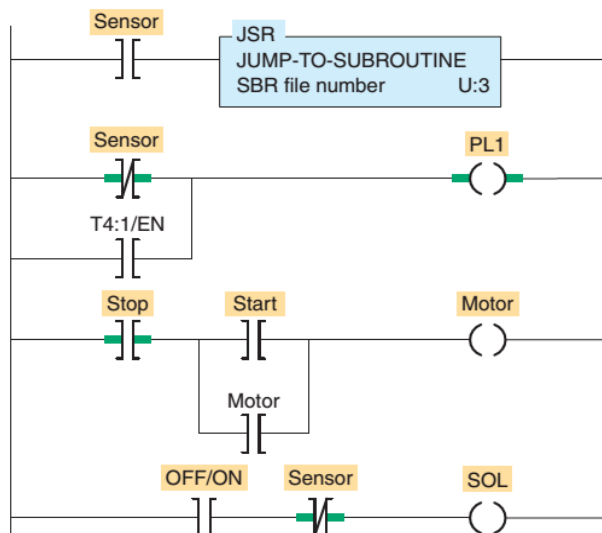
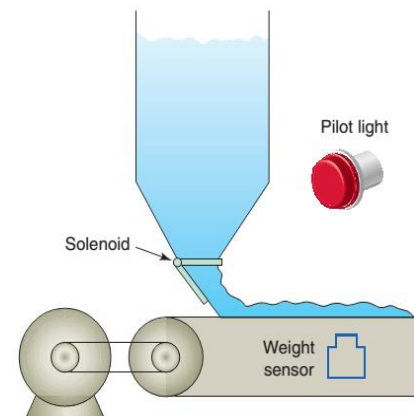
- 1.1** The control plan stored in the PLC is called:
- a program
 - a Boolean ladder
 - Fortran
 - A microprocessor
- 1.2** In ladder logic, an input cannot be connected to more than one output
- The speed of the processor module
 - The length of the ladder program
 - The type of instructions executed
 - The actual ladder true/false conditions
- 1.3** A PLC down counter counts true-to-false transitions!
- TRUE
 - FALSE
- 1.4** All PLCs have analog outputs
- TRUE
 - FALSE cascading
- 1.5** The retentive timer must be intentionally reset with a separate signal
- TRUE
 - FALSE
- 1.6** The number of ladder logic virtual relays and input and output instructions is limited only by memory size
- TRUE
 - FALSE
- 1.7** When a relay is NOT energized, there is an electrical path through the NO contacts
- TRUE
 - FALSE
- 1.8** After the rung with a label is executed, the program returns to the rung after the JMP instruction
- TRUE
 - FALSE

2. Analyze ladder diagram / program

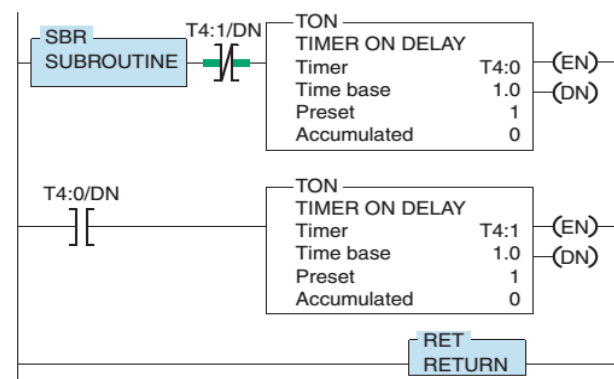
(26%)

Consider the figure to the right! The PLC program below controls the process.

- List inputs and outputs of the system!
- What happens with the solenoid valve (SOL) when the weight on the conveyor exceeds the value that makes sensor TRUE?
- When the weight sensor switch opens, the processor will no longer scan the subroutine area and pilot light PL1 will return to its normal on state



U:3



3. Design a ladder diagram / program

(50%)

A pump is used to transfer fluid from Tank A to Tank B.

- Before starting, PS1 must be closed (indicates there is some fluid in A).
- When the pump **start button (NO)** is pressed, the pump starts. The button can then be released and the pump continues to operate. When the **stop button (NC)** is pushed, the pump stops.
- PS2 and PS3 must be closed for 5s after the pump starts. If either PS2 or PS3 opens, the pump will shut off and will not be able to start again for another 14s.
- In addition, the pump will not start if the level switch A is open, or level switch in B is closed.

HINT: You may want to use TON and TOF here...

