



COLLEGE OF ENGINEERING, SCIENCE & TECHNOLOGY

SCHOOL OF ELECTRICAL & ELECTRONIC
ENGINEERING

TRADE DIPLOMA IN ELECTRICAL ENGINEERING
(ELECTRICAL/RENEWABLE ENERGY)
STAGE 3

EEE520 –Programmable Logic Control

SEMESTER 1 - 2014.

DAY/DATE: TIME: ROOM: As per timetable.

INSTRUCTIONS TO STUDENTS

1. *You are allowed 10 minutes Extra reading time during which you are NOT to write.*
2. *Begin each answer on a fresh page and use both sides of the sheet.*
3. *Write your candidate-number at the top of each attached sheet.*
4. *Insert all written sheets in their correct sequence and secure with string.*
5. *For all sheets of paper on which rough/draft work has been done, cross it though and you MUST ATTACH to your answer scripts.*
6. *Write clearly the number(s) of the question(s) attempted on the top of each sheet.*
7. **ANSWER ALL QUESTIONS.**
8. *Show all workings where necessary.*
9. *Do not use programmable calculators, especially the ones that does the conversions of number systems.*
10. ***ALWAYS CHECK YOUR WORK BEFORE YOU LEAVE THE ROOM!***

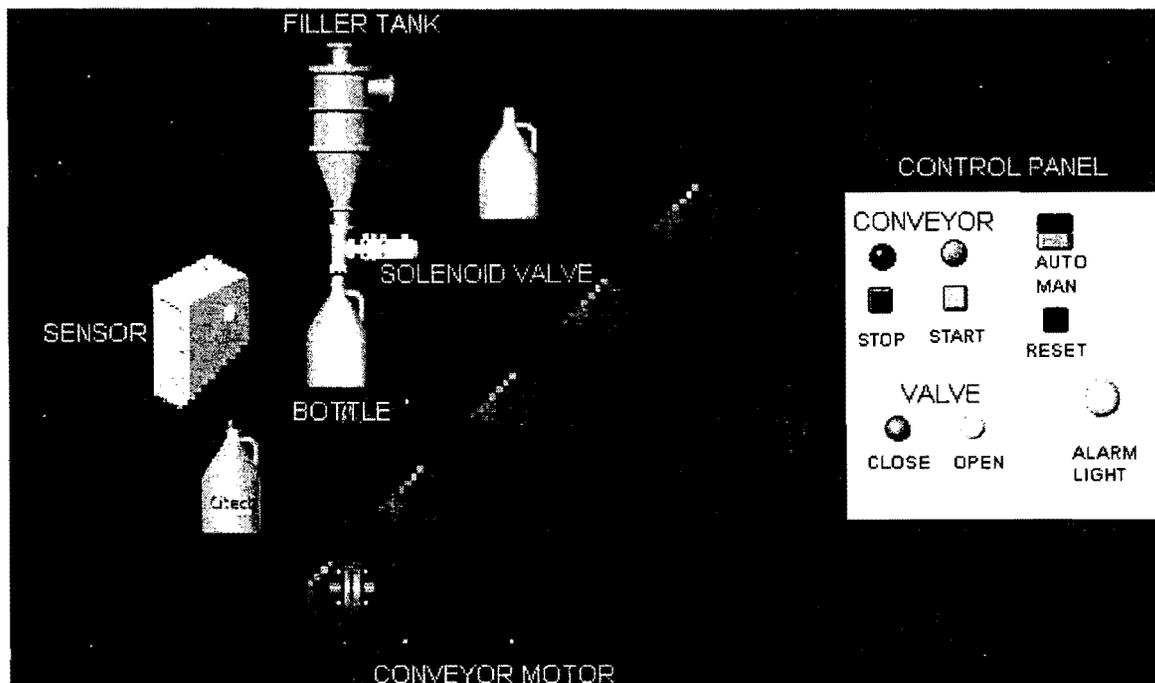
SECTION C

Instruction:

Answer all questions.

Question 1

As a PLC engineer you are required to design the ladder logic for the bottle filling machine based on the specifications given. (10 marks)



OPERATION

Fill the bottle for 10 seconds when the proximity turns on. If the bottle stays over the proximity for more than 5 seconds after filling, indicate that a fault has occurred by turning on the product jammed light.

Inputs	Proximity	0.02
Start	Pushbutton	0.04
Stop	Pushbutton	0.08
Outputs	Filling Valve	100.10
	Product jammed lamp	100.01
	Conveyor motor	100.05

Question 2

Design the ladder logic used to rinse the process tank after each process reaction with the water fill, mix and flush described in the process statement. The empirical design information includes:

- All data values present are integer data
- The selector switch is in the rinse position and the tank is filled with water and then drained. The mixer is used throughout the cycle.
- Outputs are mixer contactor, water drain valve, and water fill valve.

The following Boolean logic should be used in the ladder design

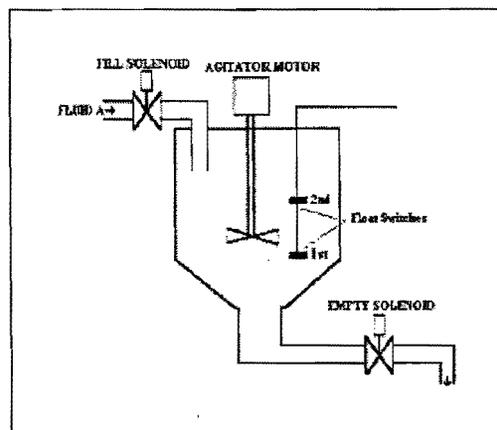
- Mixer contactor = rinse selected AND low level float switch
- Rinse water fill valve = start bit AND rinse selected AND NOT high level float switch AND NOT rinse water drain valve
- Rinse water drain = start bit AND rinse selected AND high level float switch (sealed with rinse water drain valve XIC instruction) AND low level float switch

(20marks)

Question 3

The sequence of the given process needs to be controlled. The process should be started by pressing a START switch and can be stopped by pressing a STOP switch. Both start and stop switches are momentary contact type switch. The float switches are both normally opened (NO) and both the solenoid is energized to open. The sequence of the process should be as follows:

First the FILL SOLENOID will open as soon as the start switched is pressed allowing fluid A to flow into the tank. As soon as the fluid level reaches 2nd (upper) float switch FILL SOLENOID must close and an AGITATOR motor will start and the agitator should run for 2 minutes. As soon as the agitator stops, EMPTY solenoid will open and empty the process fluid from the tank. The EMPTY SOLENOID remains open until the tank level comes down to 1st (lower) float switch. Once the tank is empty, the process should wait for another manual start of the process. Implement using the PLC control. Use the appropriate software to draw control and power circuit.



(20 marks)

All the Best
The End...