A

Bachelor of Engineering – Mechatronics Program

Programmable Logic Controllers: MENG 3500 Course

Quiz No. 1 [5 marks]

1,45

Time allocated: 15 minutes
If you need more space for each question, please use the back of the sheet.

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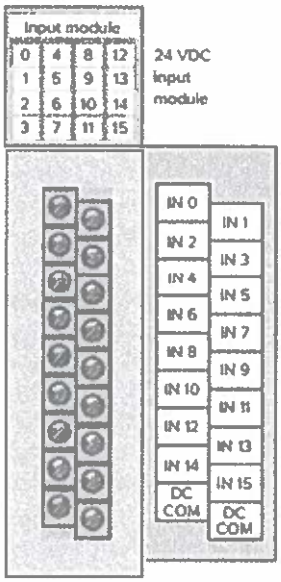
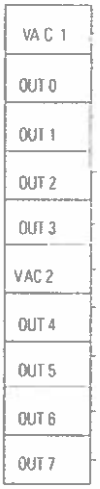
Student Number: N01500049

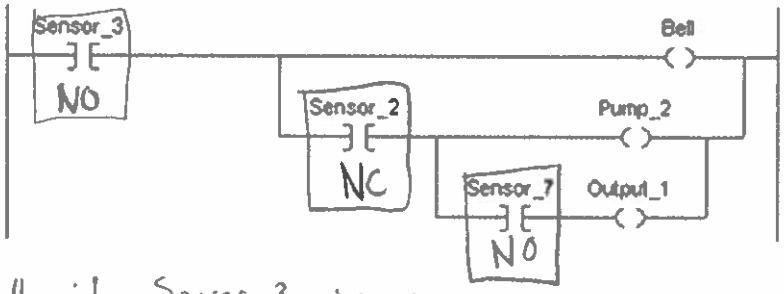
1. Provide complete wiring connections for four discrete input field devices (such as toggle switches, pushbuttons, limit switches, and sensors) to the input module, including the power source. Clearly specify whether the field devices and the input module operate in a sinking or sourcing configuration. [1 mark]



2. Provide complete wiring connections for four discrete output field devices (such as small motors, motor starters, solenoid valves, and indicator lights) to the output module, including the power source. Clearly specify whether the field devices and the output module operate in a sinking or sourcing configuration. [1 mark]



3. Provide a detailed explanation of the conditions required (status of the inputs) for each of the three outputs in the ladder logic below to be energized, considering that Sensor 3 and Sensor 7 are Normally Open (NO) field devices, while Sensor 2 is a Normally Closed (NC) field device: [0.5 mark]

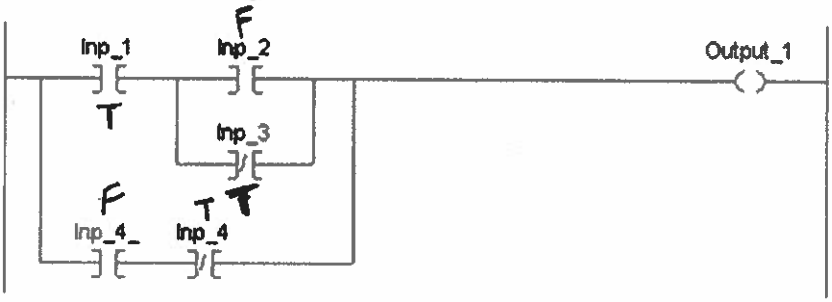


0, 2

Well if Sensor 3 is NO then the bell is gonna ring until Sensor 3 is closed causing Sensor 2 to allow electricity to go to pump 2 & since Sensor 7 is NO it's gonna allow output_1 to have electricity

Bell on if S_3 High.
Pump 2 ON if S_3 High & S_2 Low
Output 1 ON if S_3 High, S_2 Low & S_7 high

4. Provide the state of the Output_1 for the following input conditions: [0.5 mark]
   Inp_1 is in state logic 1 / true, and Inp_2 is in state logic 0 / false; and Inp_3 is in state logic 0 / false; and Inp_4 is in state logic 0 / false



Output_1 should be on because of Inp_1 & Inp_3

0,5

5. Develop a ladder logic program to meet the following requirements: A signal lamp should turn on when the pump is running and the pressure sensor is activated, or when the test switch is closed. Use the I/O names provided in the table for your logic. A wiring diagram is not required. [1 mark]

I / O Name	Function
Test	Field Device / Real World Switch NO
Signal_Lamp	Field Device / Real World Discrete Output
Pump Status Indicator	Field Device / Real World Discrete Input/Output
Pressure Sensor	Field Device / Real World Discrete Sensor Input NO

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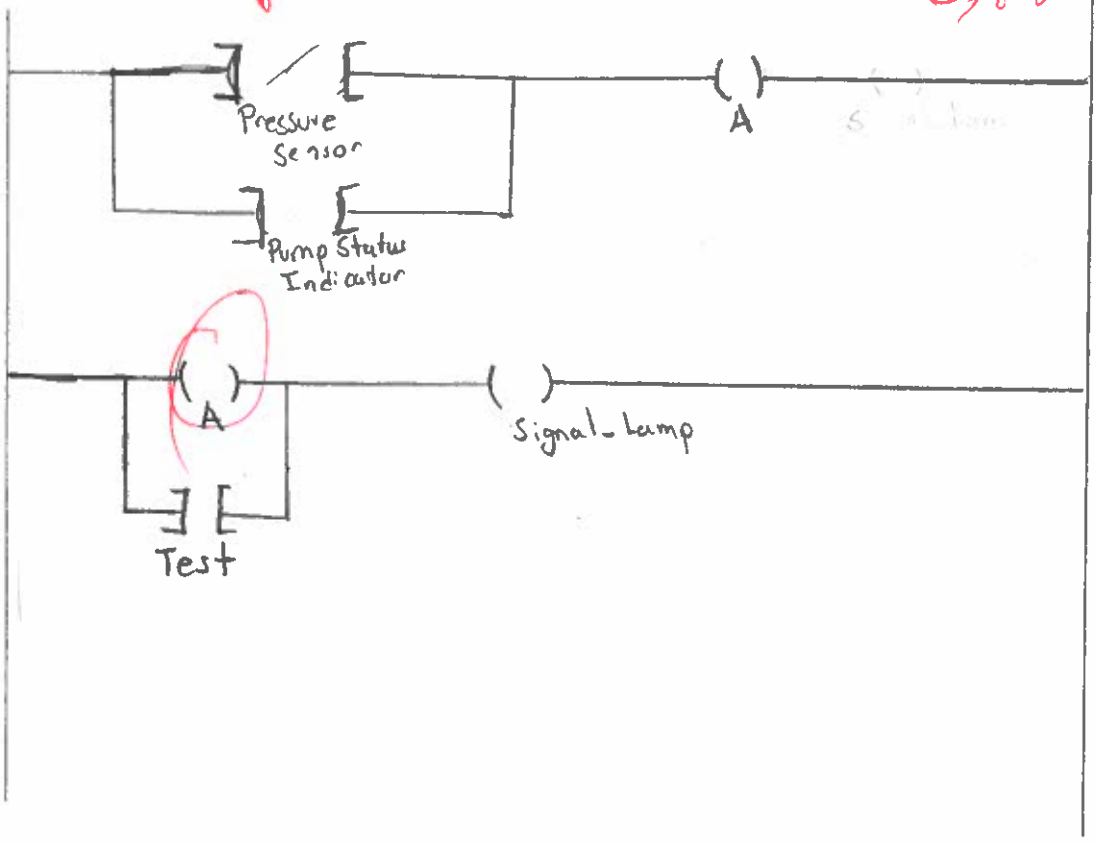
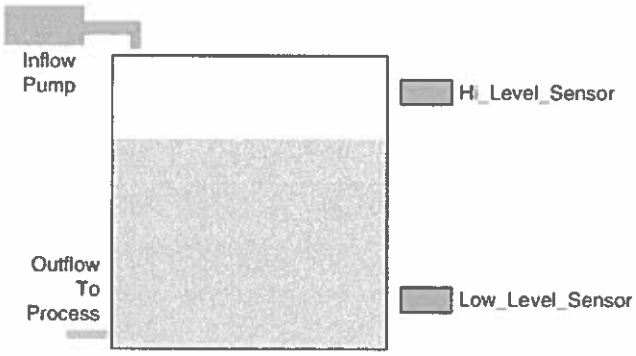


6. Develop a ladder logic program for the following application: Use momentary Start and Stop pushbuttons to control a pump, ensuring that the tank does not run empty or overflow. Use the I/O names provided in the table for your logic. A wiring diagram is not required. [1 mark]



I / O Name	Function
Start	Field Device / Real World Pushbutton NO
Stop	Field Device / Real World Pushbutton NO
Run	Bool / Internal
Pump	Field Device / Real World Discrete Output
Hi_Level_Sensor	Field Device / Real World Discrete Sensor NO
Low_Level_Sensor	Field Device / Real World Discrete Sensor NO