PLC Test Questions 2023

Abbreviations used:

- Programmable Logic Controller (PLC)
- Ladder Logic Diagram (LD)
- Function Block Diagram (FBD)
- Sequential Function Chart (SFC)
- Human Machine Interface (HMI)

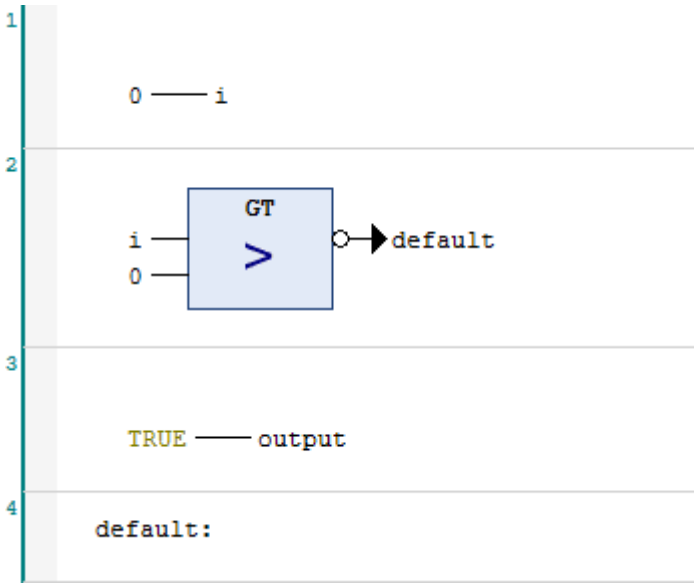
Instructions:

Upload your submission as a single .zip archive. Ensure it contains your answers for all of the test's questions.

Questions:

1. [4 Marks] What is LD? What are the advantages and disadvantages of programming a PLC using LD?
2. [4 Marks] What is SFC? What are the advantages and disadvantages of programming a PLC using SFC?
3. [2 Mark/s] Create a LD network that represents two, normally open switches, *S1* and *S2* that must be closed to turn on a motor, *M1*.
4. [6 Mark/s] Write a LD program that will continuously switch on an output, *L1* for 1 s, then switch it off for 5 s.
5. [6 Mark/s] Consider the following FBD program:

```
VAR
    i : INT := 0;
    output : BOOL := FALSE;
END_VAR
```



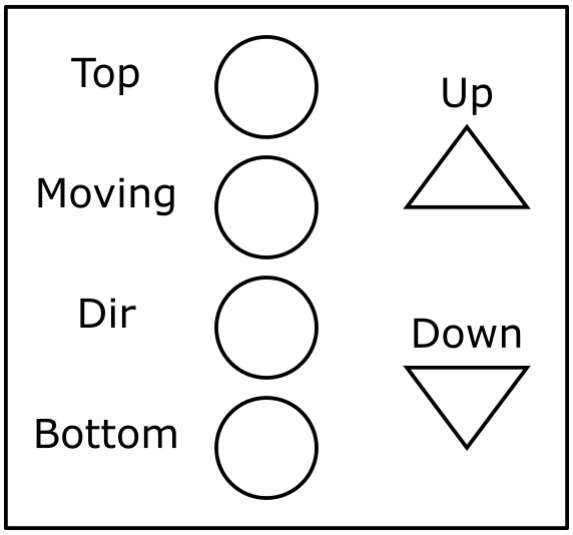
Describe, in your own words, what it does. What will output's value be once it has been executed once?

6. [10 Mark/s] Consider the following description of a machine's operation:

- Two parts are inserted into a jig.
- An operator presses a button.
- If the parts are inserted in the jig and the button is pressed, a pneumatic cylinder extends for 1 s, pressing the parts together, and then retracts.
- The operator removes the combined part from the jig.
- The machine waits for parts to be inserted.

Write a SFC program that can be used to control the machine. Include FBD actions for each step.

7. [10 Mark/s] Consider the following HMI:



Do the following:

1. Create an equivalent visualization in TwinCAT.
2. Map the "Up" widget to an "upButton" variable.
3. Map the "Moving" widget to a "moving" variable.
4. Add a LD program to your project.
5. Add a network to your program that toggles the "Moving" widget's colour when the "U"" widget is pressed.