Question 1: Choose the right answer [9 marks]

1. An example of discrete (digital) control is:
   a. Varying the volume of a music system
   b. **Turning a lamp ON or OFF**
   c. Varying the brightness of a lamp
   d. Controlling the speed of a fan

2. A solenoid is an example of an output device.
   a. **True**
   b. False
   c. None of the above

3. To increase the number of inputs and outputs of the PLC, one can use expansion modules.
   a. **True**
   b. False
   c. None of the above

4. The part that monitors the inputs and makes decisions in a PLC is the CPU.
   a. **True**
   b. False
   c. None of the above

5. One of the following is an input device
   a. Motor
   b. Light
   c. Valve
   d. **Sensor**

6. Which one of the following is not a PLC manufacturer
   a. Siemens
   b. Mitsubishi
   c. **Microsoft**
   d. ABB
7. Solenoids, lamps, motors are connected to:
   a. Analog output
   b. **Digital output**
   c. Analog input
   d. Digital input

8. In a PLC “I” is used for output and “Q” is used for input
   a. True
   b. **False**
   c. None of the above

9. PLC stands for programmable logic controller
   a. True
   b. **False**
   c. None of the above

Question 2: Complete the following diagram that shows the elements of a control system. [3 marks]

```
Input → Process → Output
```

Question 3: State an example of a control system and divide it into its 3 elements as answered in the previous question. [5 marks]

You can state any example of a simple control system and divide it into the 3 parts.

**Example**

**Automatic doors:**

**Input:** Sensor

**Process:** sending the signal from the sensor to the controller and controller to the output

**Output:** Motors rotating
Question 4: identify the LOGO! Basic PLC module components that are marked in the figure and write them in the table provided: [6 marks]

<table>
<thead>
<tr>
<th>Number</th>
<th>Part Name</th>
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<tbody>
<tr>
<td>1</td>
<td>Power Supply Connection</td>
</tr>
<tr>
<td>2</td>
<td>Input Connection</td>
</tr>
<tr>
<td>3</td>
<td>Output Connection</td>
</tr>
<tr>
<td>4</td>
<td>Module slot</td>
</tr>
<tr>
<td>5</td>
<td>Control Panel</td>
</tr>
<tr>
<td>6</td>
<td>CDDisplay Unit/ L</td>
</tr>
</tbody>
</table>
Question 5: make the required hardware connections on the figure below and label the inputs outputs. The question and equation for the connections will be given to you on the spot in your classroom. [12 marks]

The answer for this question will depend on the problem given to you in class.

Question 6: classify the following as automatic control, manual control AND discrete control or continuous control. [5 marks]

a) A sensor is used to turn on and off the lights of a room.
b) A temperature sensor is used to adjust the room temperature and maintain it at a set point.
c) A user starts the bottle filling machine, places the bottle on the conveyor belt to fill it with the required liquid.
d) The luggage system at the airport.
e) A factory that makes red pens and has no human employees.

<table>
<thead>
<tr>
<th>Continuous Control</th>
<th>Discerte Control</th>
<th>Automatic Control</th>
<th>Manual Control</th>
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</thead>
<tbody>
<tr>
<td>c</td>
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