

Menoufia University
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Mid-Term Exam
 Date: 31 / 3 / 2019
 Exam Type: Written
 Exam Time: 60 Minutes
 Exam Marks: 10 Marks
 Examiners:
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Name:
 Number:

Answer the following questions:

Question 1

[5 marks]

Choose the correct answer and write your answer in the table shown below:

- A Nano PLC timer with a time base of 1 sec can count to a maximum value of
A. 2 h 46 min 39 sec B. 2 h 46 min 65 sec C. 2 min 46 sec 65 msec D. 2 D 46 h 39 min
- In Nano PLC, the output point number 5 used as I/O extension should be written as
A. %Q2.5 B. %Q3.5 C. (i) %Q0.5 D. %Q1.5
- The component of a PLC that makes decisions and executes control instructions based on the input signals is:
A. Programming device B. Input module C. CPU D. Operator interface
- The ----- is used to transfer the required program to the memory of the PLC unit.
A. Programming device B. Memory unit C. Control unit D. User program
- Which of the following is most likely to be the voltage level used internally in a PLC, excluding the voltage levels that might occur during conditioning in input/output channels?
A. 240 V B. 24 V C. 110 V D. 5 V
- Figure 1 shows a ladder diagram. Which of the following timing diagrams represent inputs and output signals of this ladder program?

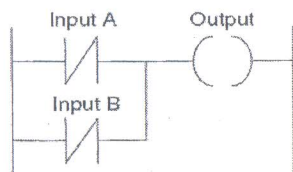
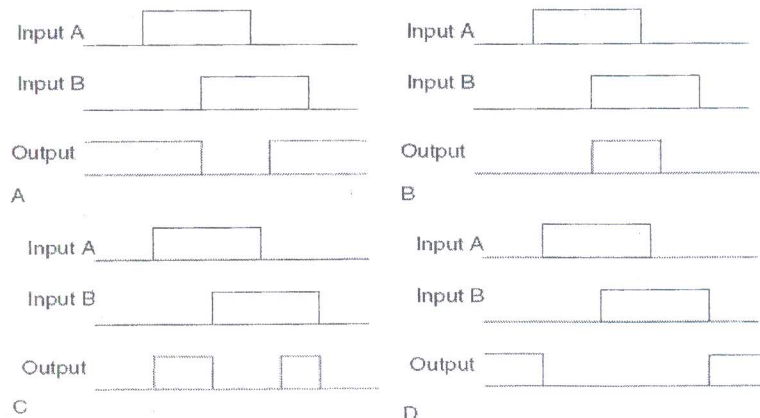


Figure 1



7. The output of the pulse timer (TP) equals to zero when

- A. The current value equals to the preset value B. Its input is zero
C. The time base equals to 1m D. The preset value equals to 9999 only

8. The PLC with relay type

- A. is used for DC switching only B. is used for DC and AC switching
C. is used for AC switching only D. is used for AC high loads only.

9. For each type of timers, the current value word "%T_{Mi}.V" can be

- A. Read and written B. Read and tested only
C. written only D. written, read and tested

10. Which type of timers is that its bit %T_{Mi}.Q is set to 1 when the current value equals to the preset value?

- A. TP B. TOF C. TON and TP D. TON

Number	Answer
1	
2	
3	
4	
5	
6	
7	
8	
9	
10	

Question 2

[5 marks]

Design a PLC program to control the 3-phase motor of a pump feeding the water tank shown in figure 2. The tank is equipped with four normally open PNP capacitive proximity sensors ; **UFL** (underflow level safety sensor) near the bottom of the tank; **LL** (low level) at a height of 40% for the tank; **HL** (high level) at a height of 90% for the tank; and finally **OFL** (overflow level safety sensor) near the top of the tank. The operation conditions of this system are:

- 1- The proximity sensors **LL** and **HL** maintain the water level between 40% and 90% after pressing a **normally open start push button switch** (i.e., when **LL** senses that the tank is empty, the pump runs until the **HL** senses that the tank is full then the pump stops).
- 2- When a **normally closed stop push button switch** is pressed, the pump motor stops its operation.
- 3- For safety, if the water level decreases below **UFL**, the pump runs and an indication lamp **L2** turns on until the operator stops the operation.
- 4- For safety, if the water level reaches the overflow sensor **OFL**, the pump stops and both the indication lamp **L1** and the alarm buzzer **H1** work until the operator stops the operation.

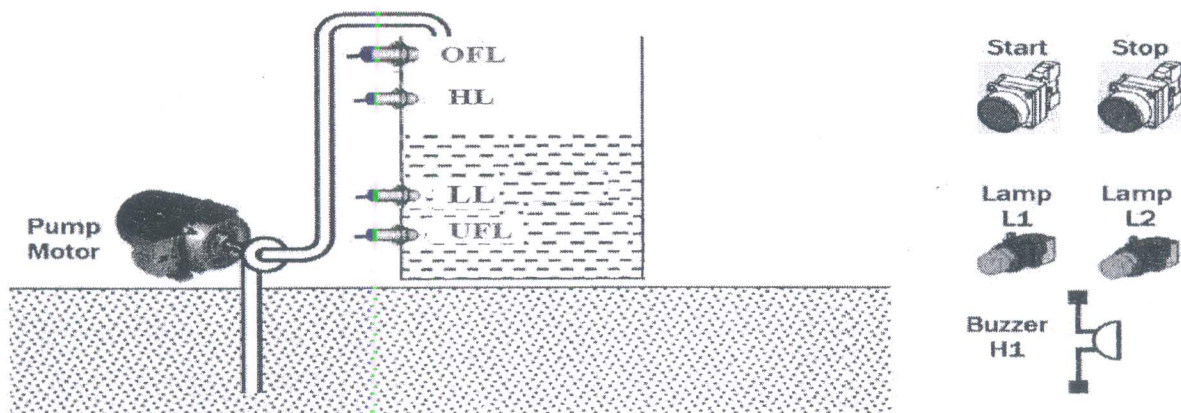


Figure 2

NOTE

- The two Lamps **L1** and **L2** are operated by 220 VAC. Two relays with suitable values of voltage and current related to lamps: **R1** for lamp **L1**, and **R2** for Lamp **L2**.
- The sound alarm (Buzzer **H1**) for overflow is operated by 24VDC.

Write the following programming procedures:

- Input-output addressing.
- Draw power and control circuit connections.
- Program steps using Ladder diagram.