Benha University
Faculty of Engineering (Shoubra)
Electrical Engineering and Control Program Department
3rd Year Electrical Power

Final Term Exam
Date: 19/05/2019
Industrial Control (1) "EEC412"
Duration: 2 Hours

- Answer all the following questions.
- Illustrate your answers with sketches if necessary.
- Number of questions: 4
- The exam consists of two pages.

Q.1 ***Write true or false with correcting the wrong statement*** ***(10 marks)***

1- When normally open type contacts are actuated, they disrupt the power supply through them.
2- The type of memory which is fast and temporarily stores the data which are immediately required for use is RAM.
3- Base 10 refers to binary coded decimal number system.
4- In a PLC, the scan time refers to the amount of time in which the entire program takes to execute.
5- Hardware test stand used to execute the I/Os of hardware devices in the field.
6- In PLC programming, a retentive function is one that is not reset after a power cycle.
7- A HMI based simulator can be automate response for the command of a PLC program.
8- An OR function implemented in ladder logic uses normally-open contacts in parallel.
9- The latch circuit maintains the state until another input is received.
10- A switch or a pushbutton is a discrete input.
11- The basic logic gate whose output is the complement of the input is the OR gate.
12- Cumulative addition of four bits (1 + 1 + 1 + 1) gives 1111.
13- During programming, the PLC should be in the terminal mode.
14- Term that refers to infinite number of values in range is digital signal.
15- Binary values are represented by values or ranges of values of physical quantities.
16- Positive integer means encoding data into bits.
17- Binary to hex conversion, four binary digits can be converted to three hexadecimal digits.
18- The I/O module units form the interface between the micro-electronics of the programmable controller and the real world outside.
19- The power supply of the PLC executes the user-program over and over again when it is in the RUN mode.
20- One of the advantages of PLC is that it can be programmed by non-specialists.

With our best wishes *Associate Prof. Dr. Mohamed Ahmed Ebrahim*

Q.*2** ***(10 marks)

a) Explain briefly the main components of industrial control system.

b) Construct the power, control and ladder circuit diagrams for starting a 3-phase electric motor. Use light indicators to indicate the status of the motor.

Q.*3** ***(10 marks)

a) Classify the sensors according to the type of energy they detect. Mention the factors which affect the selection of a suitable sensor to measure the desired physical parameter.

b) Construct the ladder diagrams for the following control processes:

1- Traffic light as follows: 60 Sec. green, 5 Sec. yellow and 60 Sec. red.

2- Cutting machine using two switches in series.

3- Count-up process where output will turn on after the input switch has been closed 15 times. Use push button to reset the counter.

Q.*4** ***(10 marks)

a) Explain briefly the various PLC testing methods.

b) Construct the power, control and ladder circuit diagrams for starting a 3-phase electric motor using Star/Delta method.

With our best wishes *Associate Prof. Dr. Mohamed Ahmed Ebrahim*