MENOUFIYA UNIVESITY FACULTY OF ELECTRONIC ENGINEERING – MENOF	SUBJECT: PLC COURSE	DEPARTMENT OF INDUSTRIAL ELECTRONICS AND CONTROL ENGINEERING
	26 / 12 / 2019	
B. Sc. GRADUATE EXAMINATION	FIRST TERM EXAMINATION	TIME ALLOWED: THREE HOURS

ANSWER ALL THE FOLLOWING QUESTIONS

First Question: *(25 Marks)*

In your company the automatic drilling machine is one of its products. Your team has the order to design the main part of this drilling machine. This part is consisting of: up-down moving part, two speed (reverse rotation) DC motor, three limit switches, start drilling switch, work bench, and the work piece. A second DC motor is used to rotate the drilling tool in a unidirectional constant speed.

(1 – a) Draw the system components schematic diagram, with the operation comments.
(1 – b) Draw the two parts of system entity, with the input/output names and comments.
(1 – c) Write the input/output addressing, names and comments.
(1 – d) Draw the ***PLC*** actuators wiring diagrams.
(1 – e) Draw the ***PLC*** sensors wiring diagrams.
(1 – f) Draw the two ***PLC*** control ***GRAFDET or SFC***, descriptions and addressing.
(1 – g) Write the ***PLC GRAFDET*** program in Nano ladder diagram.

Second Question: *(25 Marks)*

In an industrial automated factory, at some place on a production line, it is found that: The period between two of the ***Incoming Product*** is very smaller than the time period of the operations on the product at this place.

To decrease the operations time, one of the engineering solutions is to use three work stations at this place. These work stations are named, ***Work Stations A, B and C***. Also, a ***Rotating Arm Robot*** is used for the management of the product flow among the ***Incoming Product***, the ***Three Work Stations*** and the ***Product Delivery***.

Design a ***Sequential Flow Chart SFC or GRAFCET*** for programming this solution. Your design must include a ***Reasonable Concept***, which has four different levels of the problem analysis during the design process.

Description and Comments is OBLIGATORY

(2 – a) Draw the production line schematic diagram for the above group.
(2 – b) Indicate each one of the four levels, and draw its corresponding ***GRAFCET***.
(2 – c) Draw the total designed ***GRAFCET***.
(2 – d) Explain the advantages of this reasonable concept.
(2 – e) How we can modify and enhance the flexibility of the designed ***GRAFCET***?

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Third Question: *(20 Marks)*

The Best Report of This Term: (1)
It is OBLIGATORY to Use the Ten Design Steps Find at End of this Page
Description and Comments is Also, OBLIGATORY

The irrigation in Egypt has many types of complete structure of control and monitoring systems. One of these systems is the ***Floating Herbs Crane***. The part of crane control contains the following sensors and actuators: start and stop push buttons, 4 emergency stop switches, 4 limit switches, 2 proximity sensors (River Banks) plus 6 Proximity (Traverse the River), 3 motors.
Design a ***PLC*** controller, which can be used for this control system.
The ***PLC*** Program must be in ***SFC or (GRAFCET)***.

Fourth question: *(20 Marks)*

The Best Report of This Term: (2)
It is OBLIGATORY to Use the Ten Design Steps Find at End of this Page
Description and Comments is Also, OBLIGATORY

The irrigation in Egypt has many types of complete structure of control and monitoring systems. One of these systems is the ***Water Blocking Gate Control***. The part of gate control contains the following sensors and actuators: start and stop push buttons, 3 emergency stop switches, 5 limit switches, and one motor.
Design a ***PLC*** controller, which can be used for this control system.
The ***PLC*** Program must be in ***SFC or (GRAFCET)***.

Program Design Steps:

1. **Description of system objectives.**
2. **Detailed description of system functions.**
3. **Circuit diagram and/or block diagram of the system.**
4. **Separation of function steps.**
5. **Choice of PLC Function.**
6. **PLC input/output connection.**
7. **Input/output addresses.**
8. **Program list or diagram.**
9. **Program test and verification.**
10. **System verification.**

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