UNIVERSITI KUALA LUMPUR
Malaysia France Institute

FINAL EXAMINATION

JANUARY 2010 SESSION

SUBJECT CODE	:	FAD 10002
SUBJECT TITLE	:	INTRODUCTION TO AUTOMATION
LEVEL	:	DIPLOMA
TIME / DURATION	:	4.00pm – 6.00pm (2 HOURS)
DATE	:	05 MAY 2010

INSTRUCTIONS TO CANDIDATES

1. Please read the instructions given in the question paper CAREFULLY.

2. This question paper is printed on both sides of the paper.

3. Please write your answers on the answer booklet provided.

4. Answer should be written in blue or black ink except for sketching, graphic and illustration.

5. This question paper consists of TWO (2) sections. Section A and B. Answer all questions in Section A. For Section B, answer TWO (2) question only.

6. Answer all questions in English.

THERE ARE 8 PAGES OF QUESTIONS, EXCLUDING THIS PAGE.

SECTION A (Total: 60 marks)

INSTRUCTION: Answer ALL questions.

Please use the answer booklet provided.

Question 1

(a)   Explain in detail how automation arise. Draw the block diagram and give an example for each block.

(6 marks)

(b) - State **two (2)** advantages of automation

(2 marks)

(c)   Give **two (2)** reasons for not automating

(2 marks)

(d)   Differentiate between the human strength and machine strength

(2 marks)

(e)   Give **two (2)** examples of automated system application for each of the following environment:

i.   Service environment

ii.   Commercial environment

(4 marks)

Question 2

(a)   State all the **five (5)** elements in a feedback control system.

(3 marks)

(b)   State and draw waveforms for **three (3)** types of signals produce by sensor.

(6 marks)

(c)   Define hardware and software.

(2 marks)

(d) - Element A takes the temperature signal and transforms it to resistance signal, element B transform the resistance signals into current signal, and element C transform the current signal into a display movement of a pointer across a scale. Define element A, B, and C. Illustrate your answer using a block diagram

(6 marks)

Question 3

(a)   Pneumatic cylinder and electric motor are example of commonly used actuators in industrial application

     i.   State the type of motion generates by pneumatic cylinder and electric motor

(2 marks)

     ii.   State **two (2)** example for pneumatic cylinder and electric motor

(4 marks)

(b)   Define the basic functions of controller in the field of signal processing

(3 marks)

(c)   Give **three (3)** advantages of using PLC as a controller compared to electromechanical controls

(3 marks)

Question 4

(a)   Dominating reset is one of the memory functions for electrical signal processing.

   i.   State the other name of memory function for electrical signal processing

                                                                                    (2 marks)

   ii.   Draw the circuit for dominating reset

                                                                                    (2 marks)

   iii. Explain briefly the operation of 'Dominating Reset' circuit

                                                                                    (2 marks)

(b)   Complete the truth table in **Table 1** for each type of logic function.

Table 1: Truth Table

a	b	X = a + b	Y = a · b	Z = X + Y
0	0			
0	1			
1	0			
1	1			
		OR function	AND function	OR function

                                                                                    (6 marks)

(c)   State **one (1)** valve that have pneumatic **OR** element. Draw the valve symbol.

                                                                                    (3 marks)

SECTION B.(Total: 40 marks)

INSTRUCTION: Answer TWO questions only.

Please use the answer booklet provided.

Question 5

(a)　　**Figure 1** shows a sketch of part drilling station where a simple drilling operation requires the drill press to turn on only if there is a part present and the operator has one hand on each of the start switches. This precaution will ensure that the operator's hands are not in the way of the drill.
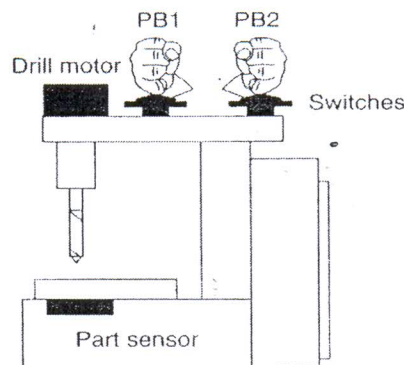

Figure 1: Sketch of Drilling Process

　　i.　　List down all the Input and Output devices, pre actuators, actuators and processor that used in the system

　　　　　　　　　　　　　　　　　　　　　　　　　　　　　　　　　　(4 marks)

　　ii.　　Explain the function of the system and illustrate your answer by using a block diagram.

　　　　　　　　　　　　　　　　　　　　　　　　　　　　　　　　　　(6 marks)

(b)　　The concept of flexible manufacturing system (FMS) is applicable to a variety of manufacturing operations and most widely applied in machining operations.

　　i.　　State **four (4)** basic components of typical FMS?

　　　　　　　　　　　　　　　　　　　　　　　　　　　　　　　　　　(4 marks)

　　ii.　　List **two (2)** advantages of FMS implementation

(2 marks)

(c)   A CIM comprise of LEVEL 1, 2, 3, and 4 as shown in **Figure 2**. Identify each levels of hierarchy in an automated factory
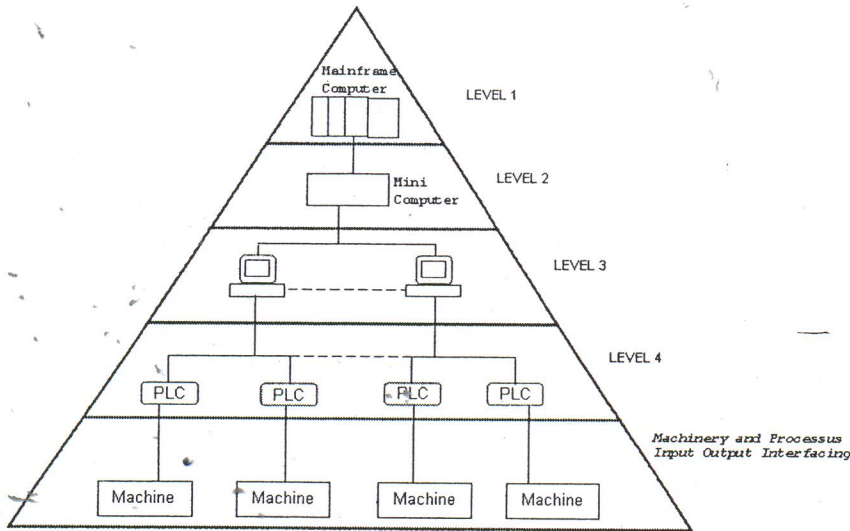
(4 marks)

Figure 2: Hierarchy in an automated factory

Question 6

(a)   A strain gauge in **Figure 3** is used to measure a force of a system. A conditional circuit is built to convert the resistance value from the strain gauge to voltage. Calculate the voltage output from the bridge circuit if the resistance value of the strain gauge is 50 Ω. Voltage supply VA = 12V
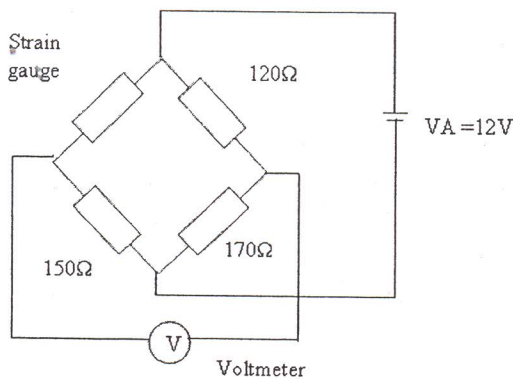

Figure 3: Strain gauge – Wheatstone bridge

(5 marks)

(b)   Sensor **S1** and **S2** are used in bottling workstation to detect presence of cap and liquid as shown in **Figure 4**. Based of figure below answer the following questions
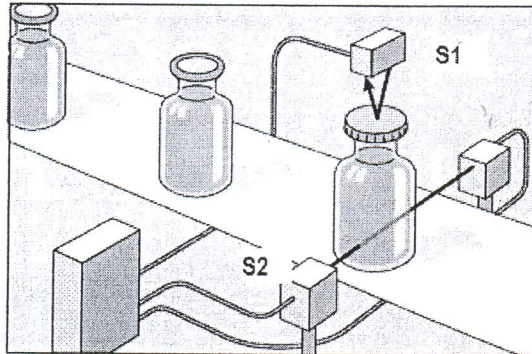

Figure 4: Bottling Cap and Liquid Detection Station

    i.   State the most suitable sensor for **S1** and **S2**

(2 marks)

    ii.   Explain why you choose those sensors

(4 marks)

(c)   State five **(5)** types of sensor detection in automated system

(5 marks)

(d)   State two **(2)** example of Wheatstone bridge application in industrial environment

(4 marks)

Question 7

(a)   **Figure 5** shows a PLC structure/hardware. Based on figure below answer the following questions
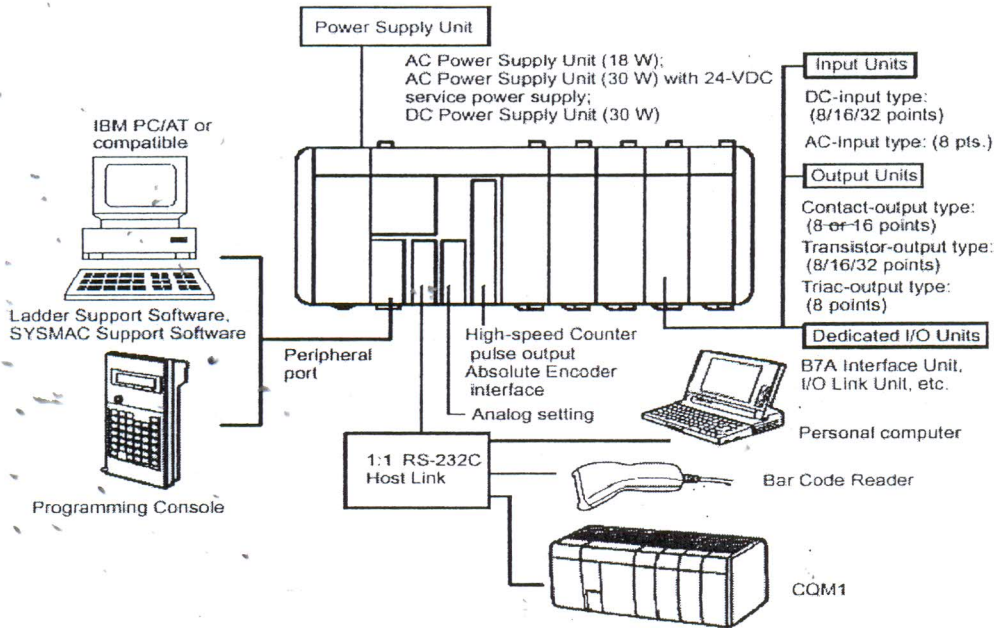

Figure 5: PLC Structure/Hardware

i.   A PLC is an electronic control with a defined internal organization. Name the four basic components that incorporates with PLC

(4 marks)

ii.   Define briefly the four basic components in PLC

(4 marks)

(b)   **Figure 6** show a 4/2 Way valve pneumatic pre-actuator. Based on this figure
      answer the following questions

     i.   Define what is pneumatic pre-actuator

                                                         (2 marks)

     ii.   Briefly explain the operation of a 4/2 way valve

                                                         (3 marks)

     iii.   Draw the symbol

                                                         (2 marks)

     iv.   State five (5) categories of pneumatic pre-actuator
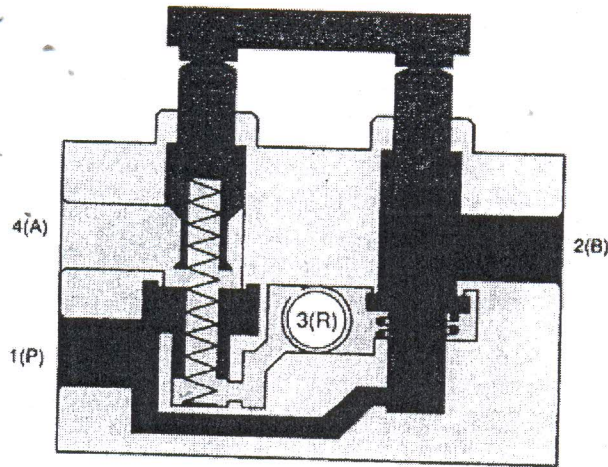
                                                         (5 marks)

Figure 6: 4/2 Way Valve

END OF QUESTIONS