



UNIVERSITI KUALA LUMPUR
Malaysia France Institute

FINAL EXAMINATION
JANUARY 2010 SESSION

SUBJECT CODE : FAD 20402
SUBJECT TITLE : PROGRAMMABLE LOGIC CONTROLLER 1
LEVEL : DIPLOMA
TIME / DURATION : 4.00pm – 6.00pm
(2 HOURS)
DATE : 03 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 one (1) question only.
6. Answer all questions in English.

THERE ARE 7 PAGES OF QUESTIONS, EXCLUDING THIS PAGE.

SECTION A (Total: 60 marks)**INSTRUCTION:- Answer ALL questions.****Please answers all in answer booklet provided.****Question 1**

- (a) Identify the relationship between relay and ladder logic
(2 marks)
- (b) List four (4) advantages of a PLC over relays.
(4 marks)
- (c) There are five different languages for PLC programming. Identify the four (4) characteristics for choosing the suitable language for the application.
(4 marks)

Question 2

- (a) Draw a block diagram showing in very general terms for **main units** in a PLC.
(4 marks)
- (b) There are two types of memory in PLC. Describe both of them.
(5 marks)
- (c) Discuss how input and output cards act as an interface between the PLC and external devices.
(3 marks)
- (d) Explain the reason for a 'self check' operation in a PLC.
(3 marks)

Question 3

(a) **Figure 1** shows the incomplete timing diagram for Counter functions. Redraw timing diagram into answer booklet for #3 set value.

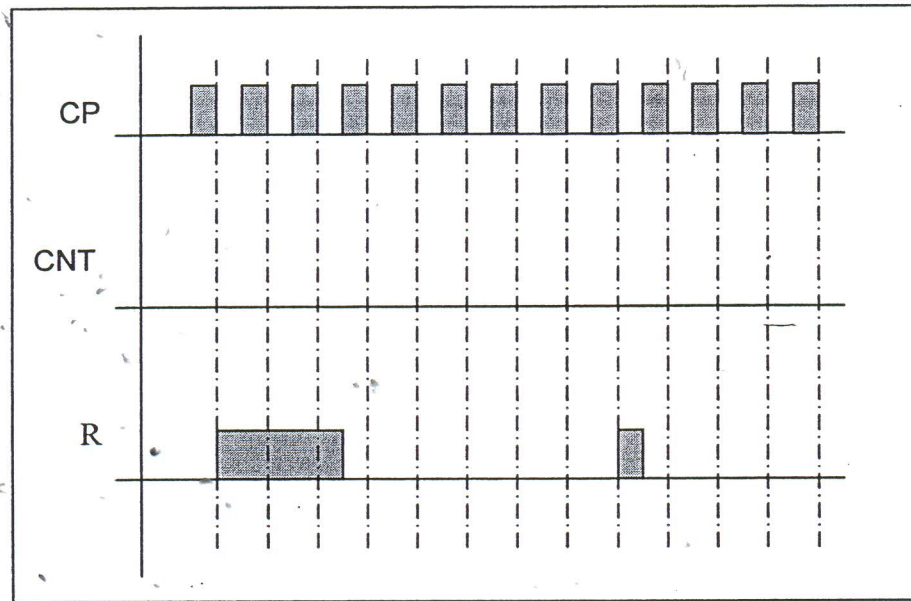


Figure 1: Counter Timing Diagram

(5 marks)

(b) Explain the function of Differentiate Up (DIFU) and Differentiate Down (DIFD).

(3 marks)

Question 4

Design a simple ladder diagram that will cause output D energized when switch A and switch B are closed or when switch C is closed.

(6 marks)

Question 5

Based on the instruction list in **Table 1**, answer all questions.

(a) Draw the ladder diagram.

(15 marks)

(b) Explanation of function of AND LD and OR LD.

(4 marks)

(c) Discuss the function of END instruction.

(2 marks)

STEP	INSTRUCTIONS	ADDRESS
00000	LD NOT	00001
00001	LD	00002
00002	AND	00003
00003	LD	00004
00004	AND NOT	00005
00005	OR LD	-
00006	LD NOT	00006
00007	AND	00007
00008	OR LD	-
00009	OR	10000
00010	AND LD	-
00011	AND	00009
00012	OUT NOT	10000
00013	OUT	10001
00014	END	-

Table 1: Instruction List

SECTION B (Total: 40 marks)

INSTRUCTION: Answer One (1) question only.

Please answers all in answer booklet provided.

Question 6

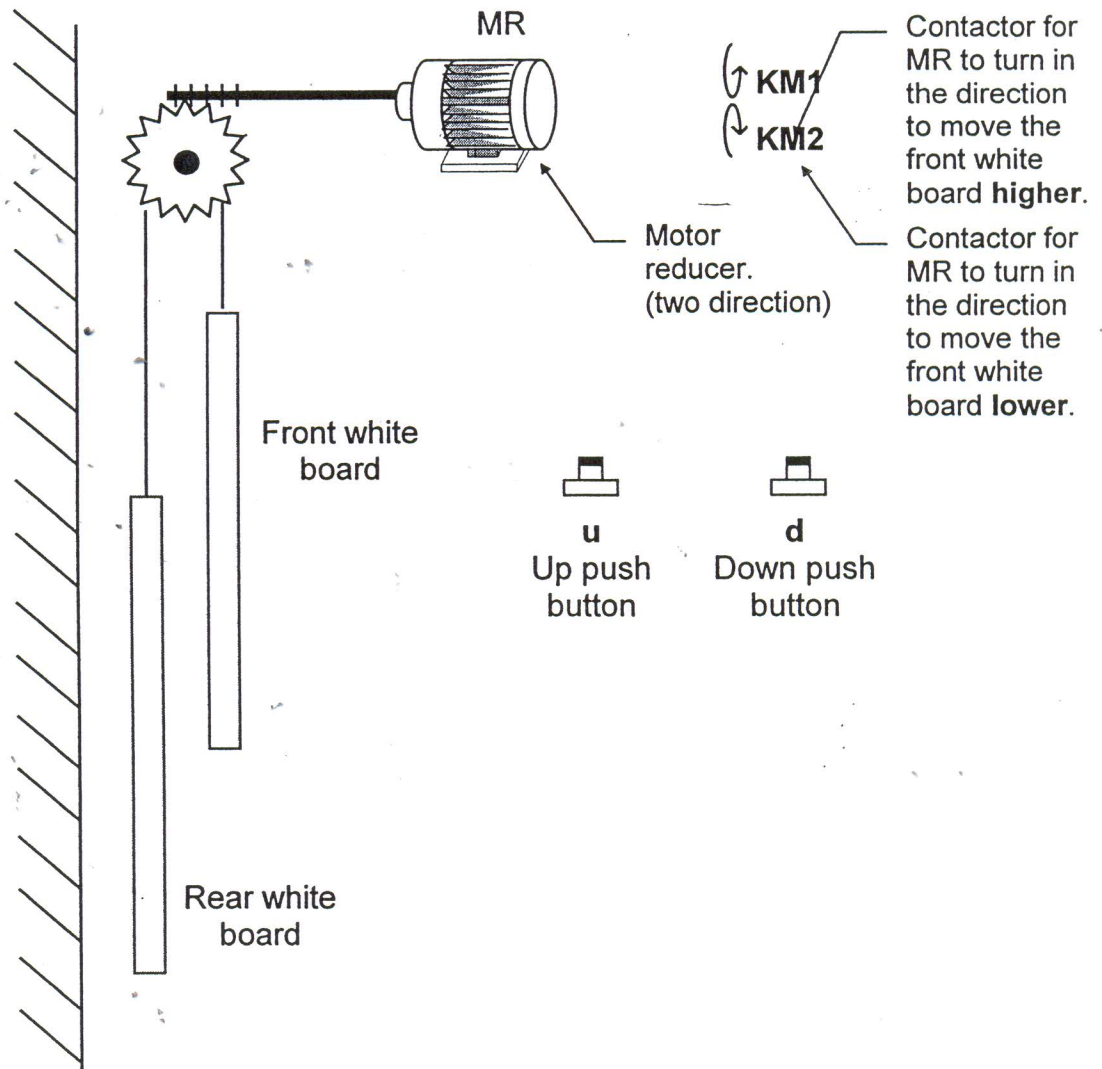


Figure 2: White Board Control System

The white board control system is used in universities lecture hall. The function of this system is to move the white boards up and down. The control is done using two push buttons:

- **u** : to move up the front white board

- **d** : to move down the front white board

The motor reducer MR which moves the white boards up and down can turn in two directions. The direction of rotation depends on which contactor is energized.

- **KM1** : direction to move up the front white board
- **KM2** : direction to move down the front white board

Description of the system:

When ST push button is pressed and released, the following will be executed:

- If non of the push buttons are pressed, the white boards are stopped
- The front white board will move up if we press the push button **u**, and it will stop when we release it.
- If we press the push button **d**, the front white board will move down. It will stop when we release the push button.

Answer the following questions:

- List all the Inputs and Outputs for the system. (6 marks)
- Draw the PLC input and output wiring. (6 marks)
- Design the Ladder diagram for the system above. (8 marks)
- Convert the ladder diagram to Instruction List. (6 marks)
- If the system is modified by adding a TIMER and COUNTER, the following will happen:
 - If we press the push button **u** and release, the front white board will move up for five seconds and stop.
 - If we press the push button **d** and release, the front white board will move down for five seconds and stop.
 - After five movements of forward and reverse, the motor will stop and lecturer needs to reset the operation again.
 Redesign the ladder diagram as according to the modification. (14 marks)

Question 7

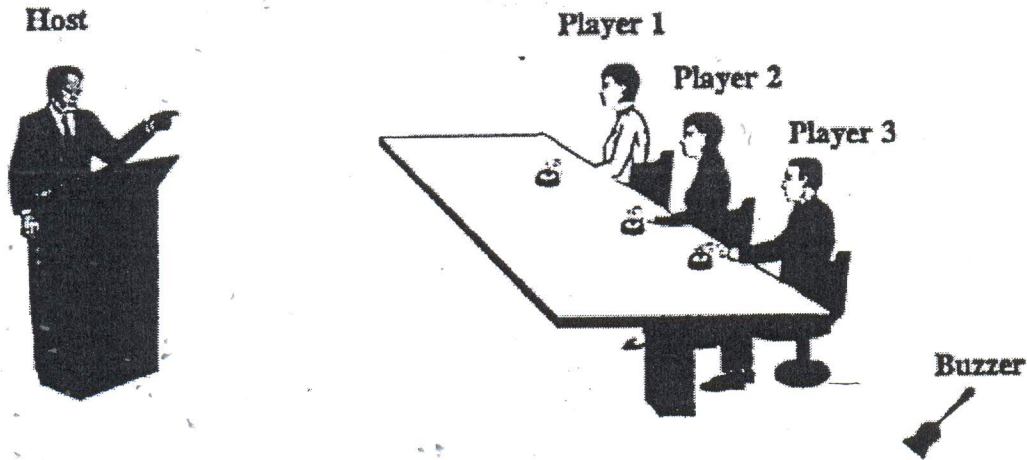


Figure 3: Pop Quiz Games

Description of the system:

When ST push button is pressed and released, the following will executed:

1. After the Host has finished with question, the 3 players will press the switch in front of them to fight to be first to answer the question.
2. The buzzer will sound for 10 sec after any one of the players has touched the switch.
3. The light indicator in front of each player will light-up and will only be reset by the Host switch.

By referring **Figure 3**, answer all the questions below:

- (a) List the PLC Input and Output Devices. (6 marks)
- (b) Draw the PLC Input and Output schematic wiring diagram. (6 marks)
- (c) Draw the ladder diagram of the system. (12 marks)

(d) Convert the ladder diagram in Q13(c) to Instruction List. (6 marks)

(e) Modify the SELF HOLDING CONTACT by using function **SET/RESET**. Redraw the ladder diagram with the necessary modification. (10 marks)

END OF QUESTION