



UNIVERSITI KUALA LUMPUR
Malaysian Institute of Marine Engineering Technology

FINAL EXAMINATION
SEPTEMBER 2016 SESSION

SUBJECT CODE : LEB 20703
SUBJECT TITLE : INDUSTRIAL AUTOMATION
LEVEL : BACHELOR
DATE : 24TH JAN 2017
TIME : 9.00 am – 12.00 pm
DURATION : 3 HOURS

INSTRUCTIONS TO CANDIDATES

1. Please **CAREFULLY** read the instructions given in the question paper.
2. This question paper has information printed on both sides of the paper.
3. This question paper consists of **TWO (2)** sections; Section A and Section B.
4. Answer **ALL** questions in Section A. For Section B, answer **THREE (3)** questions **ONLY**.
5. Please write your answers on the answer booklet provided.

THERE ARE 7 PAGES OF QUESTIONS, INCLUDING THIS PAGE.

SECTION A (Total: 60 marks)

INSTRUCTION: Answer ALL questions.

Please use the answer booklet provided.

Question 1 [CLO 1]

(20 Marks)

(a) Explain three benefits of automation system.

[3 marks – C2]

(b) Describe the meaning of a sensor and a transducer.

[(3 marks – C2]

(c) List seven (7) sensors and write their advantages.

[14 marks – C2]

Question 2 [CLO 3]

(20 Marks)

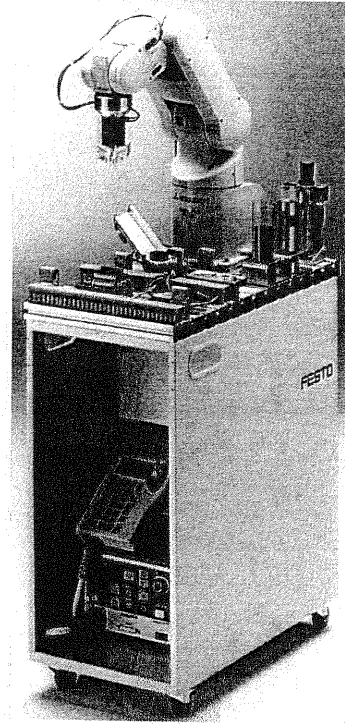
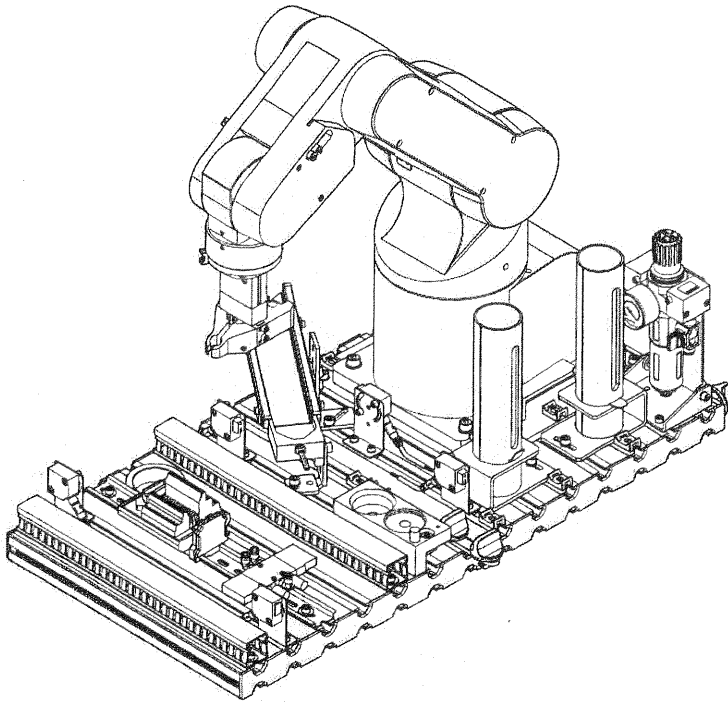


Figure 1: Robotic system.

Referring to Figure 1, answer the questions below:-

(a) Name the type of the robotic system.

[2 marks – C2]

(b) Identify the total number of axis of the robotic system.

[6 marks – C2]

(c) Choose fives (5) applications suitable for the robotic system.

[10 marks – C5]

(d) Explain one main problem of the robotic system.

[2 marks – C2]

SECTION B (Total: 40 marks)

INSTRUCTION: Answer THREE questions ONLY.

Please use the answer booklet provided.

Question 3 (CLO 2)

(20 Marks)

A sliding door is installed at Electrical Lab in UniKL MIMET. This door may be opened or closed by using two push buttons, either from outside or inside as illustrate in Figure 2. The control system is using PLC OMRON, CQM1H. Include also interlock for safety if both push buttons are being press simultaneously.

- (a) Construct a table of inputs and output of the PLC. [10 marks – C3]
- (b) Sketch the wiring diagram of the inputs and output with the PLC. Please use the diagram answer sheet in Appendix A. [4 marks – C2]
- (c) Design a control program (LADDER language) for the system. [6 marks – C6]

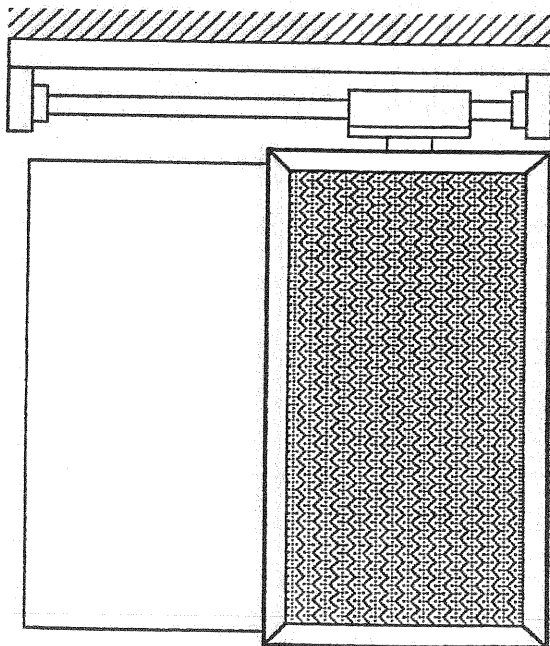
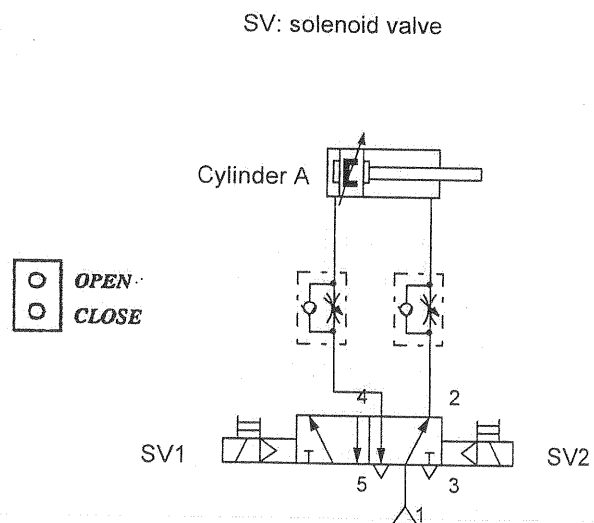


Figure 2: (a) Sliding door system.



(b) Pneumatic control circuit.

Question 4 (CLO 2)

(20 Marks)

Design and build a circuit (ladder program) to control two double acting cylinders, with a sequence **AABB** (cascade method). The circuit is to include an Emergency Stop function that will return the cylinder to its home position as illustrate in Figure 3. The control system is using PLC OMRON, CQM1H.

- (a) Construct a table of inputs and output of the PLC.

[5 marks – C3]

- (b) Design a control program (LADDER language) for the system.

[15 marks – C6]

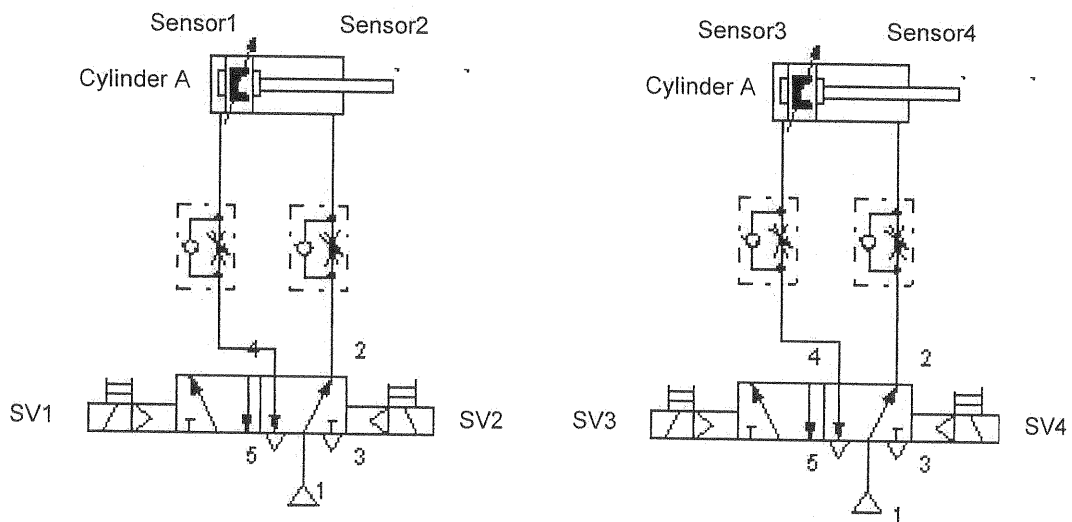


Figure 3: Pneumatic control circuit for control two double acting cylinders.

Question 5 (CLO 2)

(20 Marks)

The original sequence of the control system in Question 4 is AABB. Analyze and redesign the program, so the sequence is A+B+A-B-.

- (a) Sketch the wiring diagram of the inputs and output with the PLC. Please use the diagram answer sheet in Appendix A.

[5 marks – C2]

- (b) Design a control program (LADDER language) for the system.

[15 marks – C6]

Question 6 (CLO 2)

(20 Marks)

Design a ladder program using PLC OMRON CQM1H for the control system in Figure 4. The running light will light up in repetitive sequence starting with L1. Each of the lamps will light on for 3 sec. It should include a Start and Stop push button.

[20 marks – C6]

L: lamp

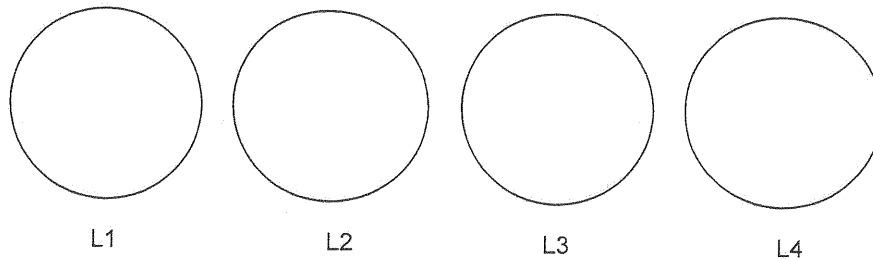
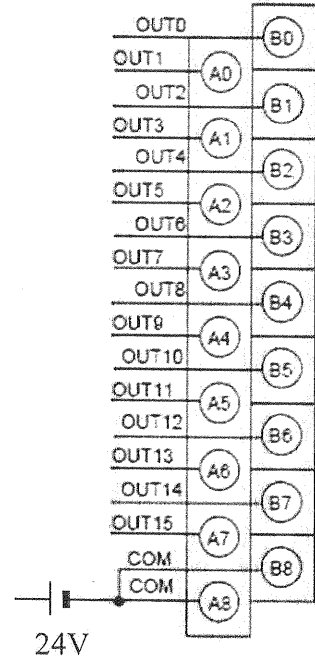
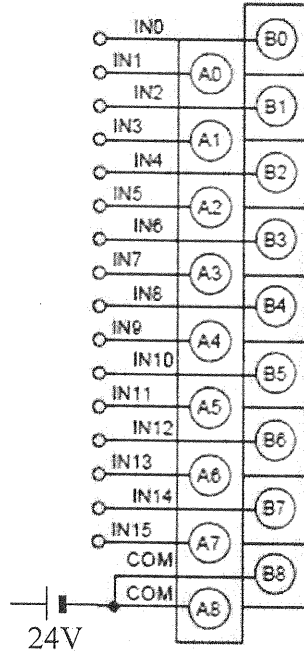


Figure 4: Running light.

END OF EXAMINATION PAPER

Appendix A

Wiring diagram for Question 3



Wiring diagram for Question 5

