UNIVERSITI KUALA LUMPUR
Malaysia France Institute

FINAL EXAMINATION

JULY 2010 SESSION

SUBJECT CODE	:	FMD 21203
SUBJECT TITLE	:	PNEUMATICS AND HYDRAULICS
LEVEL	:	DIPLOMA
TIME / DURATION	:	3.00pm – 5.30pm (2.5 HOURS)
DATE	:	19 NOVEMBER 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 6 PAGES OF QUESTIONS, EXCLUDING THIS PAGE.

SECTION A (Total: 60 marks)

INSTRUCTION: Answer ALL questions.
Please use the answer booklet provided.

Question 1

(a) Draw the symbol for following pneumatic and electro-pneumatic components:

   i)   Single acting cylinder

   ii)   Double acting cylinder

   iii)   5/3- way directional control valve mid position closed

   iv)   2/2- way solenoid valve without pilot control

   v)   3/2- way single solenoid valve with pilot control

   vi)   Dual-pressure valve (AND gate)

   vii)   Shuttle valve (OR gate)

   viii) One-way flow control valve

   ix)   Roller lever (limit switch)

   x)   Roller lever with idle return (limit switch)

(10 marks)

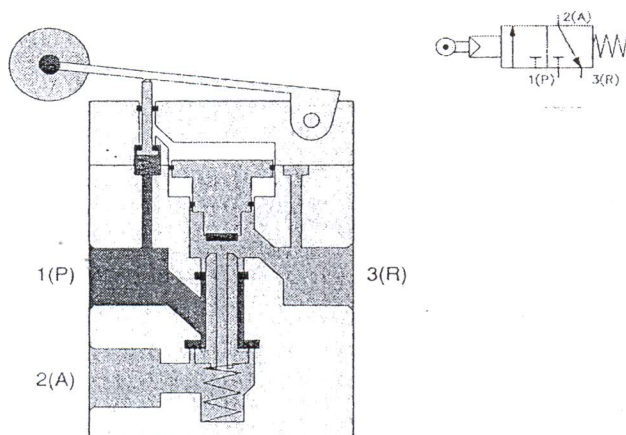(b)   Explain the air flow in roller (limit switch) shown in Figure 1:

(5 marks)

Figure 1

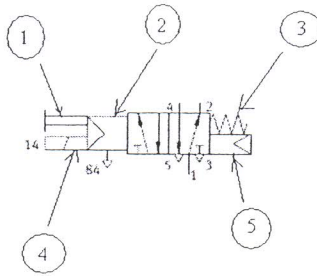(c) Describe each part in Figure 2:

(5 marks)

Figure 2

Question 2

(a)   A single acting cylinder with piston diameter **70mm** and rod diameter **40mm** is used
to clamp work piece in a production machine. Calculate the extend force of the
cylinder if working pressure used is **6 bar**. Assume that the frictional and spring
forces are **10%** and **15%** of the calculated force respectively; give your answer in
Newton (N).

(10 marks)

(b)   A hydraulic jack has a compression piston diameter of **400mm** and pump piston
diameter of **30mm** as shown in Figure 3 below. If the load on the compression piston
is **1800 N**, and need to be raised by **15mm**, calculate the force (in N) and stroke
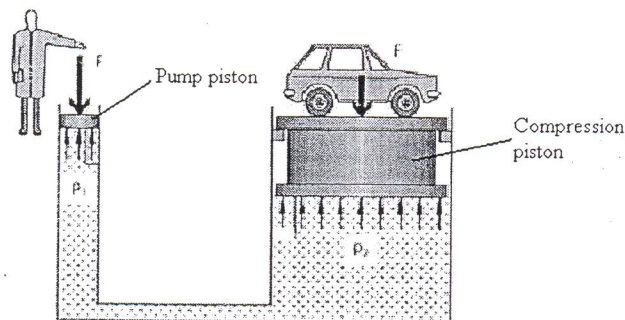needed for the pump piston (in mm).

(10 marks)

Figure 3

Question 3

Two clips are to be riveted together on a semi-automatic press as shown in Figure 4 below. Components and rivet are positioned by hand and then removed by hand on completion of the riveting operation. The working cycle starts with holding and clamping of the components by cylinder A, follow by riveting by cylinder B. One the cylinder B retracts to its initial position, the cylinder A then retracts to its initial position. The process will starts by actuating a 'Start' pushbutton.
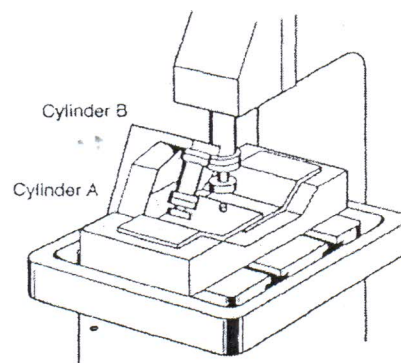

Figure 4

(a)   Draw the stroke step diagram for the cylinders.

(5 marks)

(b)   Design an electro-pneumatic circuit for the system.

(15 marks)

SECTION B (Total: 40 marks)

INSTRUCTION: Answer TWO (2) questions ONLY.
Please use the answer booklet provided.

Question 4

Packages arriving on a roller conveyor are lifted by a pneumatic cylinder and pushed onto
another conveyor by a second cylinder shown in Figure 5. Cylinder B may then perform a
return stroke only after A has reached the rear end position. The start signal should be
provided by means of a manual button, each signal initiating one cycle.
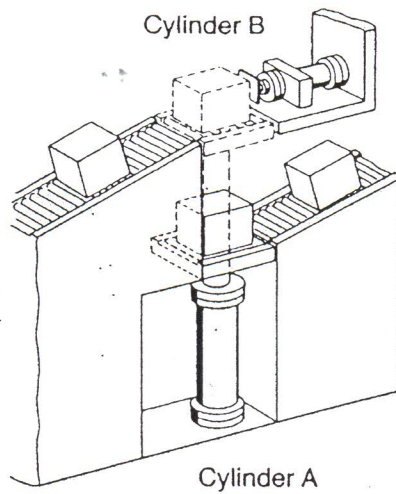

Figure 5

(a) Draw the stroke step diagram for the cylinders.

(2 marks)

(b) Design a pneumatic diagram for the above operation.

(10 marks)

(c) Design an electro-pneumatic diagram for the above operation.

(8 marks)

Question 5

A hydraulic system is used in a production line with circuit diagram shown in Figure 6.

Answer the following questions based on the circuit diagram;

(a)   Name and explain the functions of component 1, 2 and 3.

(3 marks)

(b)   State the function of component 4 in hydraulic system.

(1 marks)

(c)   Name two types of component 4 that used in industry and state its function in the system.

(2 marks)

(d)   State the different between hydraulic system with component 4 and without component 4.

(2 marks)

(e)   State the function of component 5 in the system

(1 marks)

(f)   State a function of component 6 other than works as a storage for pressure medium.
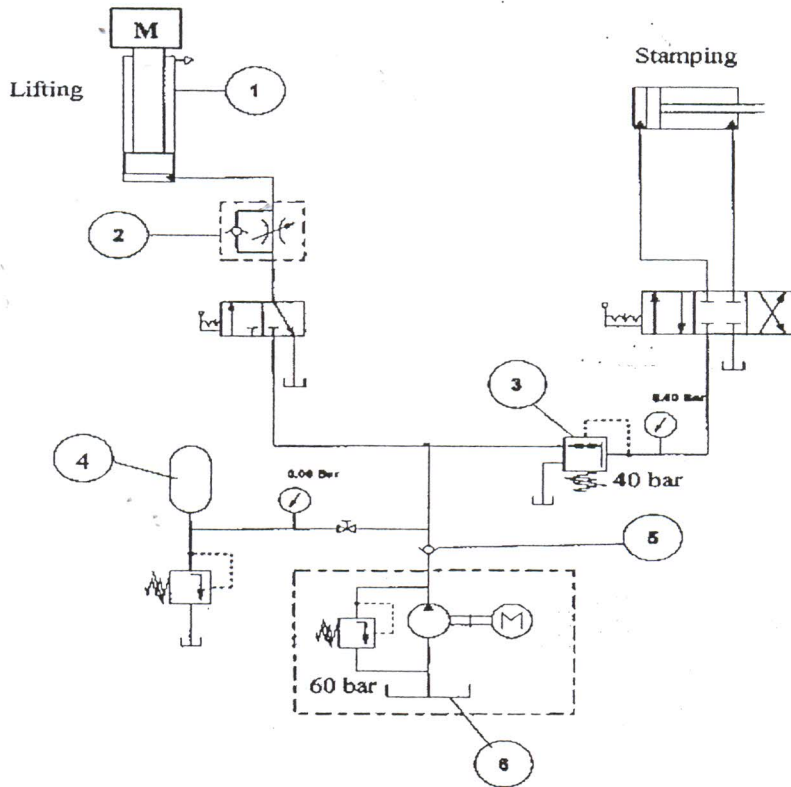
(1 marks)

Figure 6

(b)   The hose reel of a heating-oil tanker truck is driven by a hydraulic motor shown in Figure 7. This must allow the hose to be unwound, the reel to be stopped for a lengthy period, and the hose to be wound up again. A 4/3-way valve is to be used to obtain this function. The speed must be adjustable by means of a throttle valve.
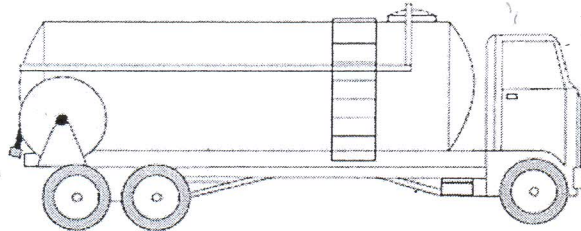

Figure 7

(10 marks)

Question 6

(a)   Explain briefly the definition of pneumatic.

(2 marks)

(b)   State the different function between one-way flow control valve and flow control valve.

(3 marks)

(c)   Explain briefly the functions of air drying in pneumatic system.

(2 marks)

(d)   List two disadvantages of electro-pneumatic.

(2 marks)

(e)   State two differences between pneumatic and electro-pneumatic

(2 marks)

(f)   State one proposes of pressure switch.

(1 marks)

(g)   "compressed air can be transmitted over long distance", is one of the pneumatic advantages. Explain briefly the phrase.

(3 marks)

(h)   Draw a simplified symbol for **service unit** and explain the function of the **filter** and **lubricator** that consist in the service unit.

(5 marks)

END OF QUESTION