



UNIVERSITI KUALA LUMPUR
Malaysia France Institute

FINAL EXAMINATION
JANUARY 2014 SESSION

SUBJECT CODE : FMB 11203
SUBJECT TITLE : PNEUMATICS AND HYDRAULICS
LEVEL : BACHELOR
TIME / DURATION : 2.5 HOURS 9.00 am - 11.30 am
DATE : 06 JUN 2014

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 5 questions. Choose and answer 4 questions only.
6. Answer all questions in English.

THERE ARE 6 PAGES OF QUESTIONS, EXCLUDING THIS PAGE.

INSTRUCTION: Answer FOUR (4) questions only.
Answer on the answer booklet provided.

Question 1

- a) Briefly explain the differences between pneumatics and hydraulics system in industry.
(4 marks)
- b) State the different function between one-way flow control valve and flow control valve.
(4 marks)
- c) State three advantages of using electro-pneumatic systems
(6 marks)
- d) Briefly explain the function of Drop-Out (off relay) delay in electro-pneumatics.
(4 marks)
- e) State 4 industrial applications of pneumatic systems.
(4 marks)
- f) State 3 functions of FRL in service unit system.
(3 marks)

Question 2

- a) A double acting cylinder with a piston diameter of 80mm and rod diameter of 10mm is to transfer finished products. The working pressure is 6 bar. Calculate the forward and retract force for the cylinder. Assume the frictional force is 10% of the calculated force, give your answer in Newton (N).

(15 marks)

- b) A single acting cylinder with piston diameter 30mm and rod diameter 8mm 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 force are 10% and 15% of the calculated force respectively; give your answer in Newton (N)

(10 marks)

Question 3

- a) A hydraulic system is used in a production line with circuit diagram shown in Figure 1. Answer the following questions based on the circuit diagram.

- (i) Name the components 1, 2, 3 and 7

(4 marks)

- (ii) State the function of component 4 in the system.

(3 marks)

- (iii) Name and state the function of component 5 in the system.

(4 marks)

- (iv) Name and state the function of component 6 in the system.

(4 marks)

- (v) State one functions of component 8 other than works as storage for pressure medium.

(2 marks)

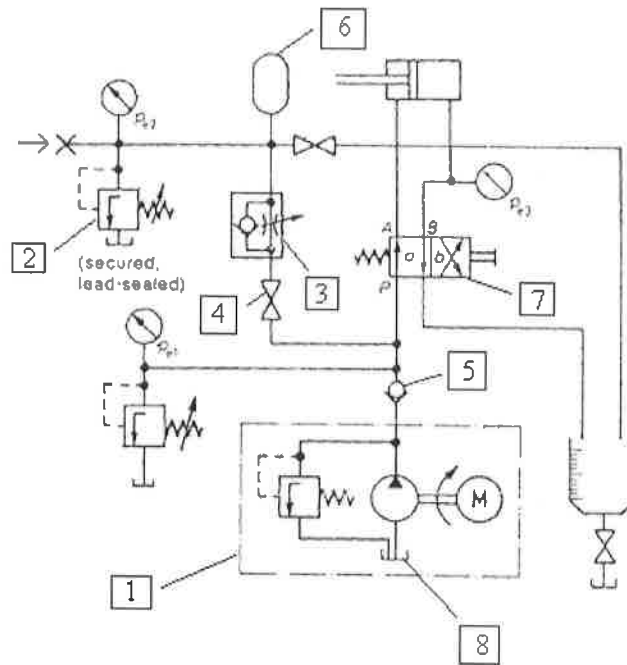


Figure 1

- b) "Temperature dependence (change in viscosity)" is one of the hydraulics disadvantages. Briefly explain the phrase.

(2 marks)

- c) "Start-up under heavy load" is one of the hydraulics advantages. Briefly explain the phrase.

(2 marks)

- d) State the differences between laminar flow and turbulent flow.

(2 marks)

- e) State the function of pressure relief valve in hydraulics system.

(2 marks)

Question 4

- a) A hydraulic jack has a compression piston diameter of 400mm and pump piston diameter of 30mm as shown in figure 2 below. If the load on the compression piston is 1800 N, and need to be raised by 12mm, calculate the force (in N) and stroke needed for the pump piston (in mm).

(15 marks)

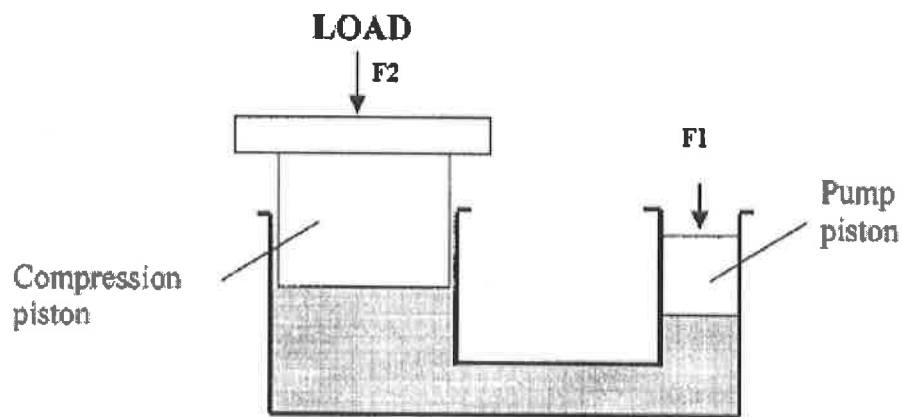


Figure 2

- b) A lifting platform is to lift a load of 15000N and is to have a system pressure of 75 bar. Calculate the piston diameter.

(10 marks)

Question 5

- a) The hose reel of a heating-oil tanker truck is driven by a **hydraulic motor**. 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. (Refer figure 3).

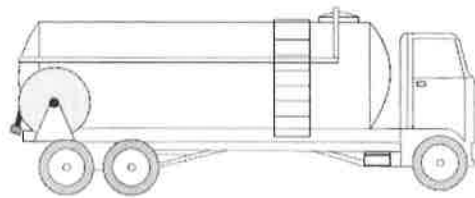


Figure 3

- (i) Design a **hydraulics** circuit diagram for the above operation.

(10 marks)

- b) Packages arriving on a roller conveyor are lifted by a **pneumatic cylinder** and pushed onto another conveyor by a second cylinder. 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 4)

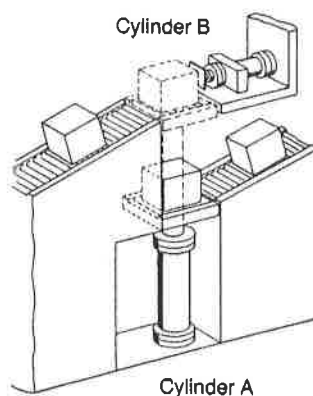


Figure 4

- (i) Draw the displacement step diagram for the cylinders.
(5 marks)
- (ii) Design an electro-pneumatic circuit diagram for the system.
(10 marks)

END OF QUESTION