



UNIVERSITI KUALA LUMPUR
Malaysia France Institute

FINAL EXAMINATION
JULY 2010 SESSION

SUBJECT CODE : FMB 11203
SUBJECT TITLE : PNEUMATICS AND HYDRAULICS
LEVEL : BACHELOR
TIME / DURATION : 4.00 pm – 6.30 pm
(2.5 HOURS)
DATE : 14 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 **SIX (6)** questions. Answer **FIVE (5)** questions only.
6. Answer all questions in English.

THERE ARE 6 PRINTED PAGES OF QUESTIONS EXCLUDING THIS PAGE.

INSTRUCTION: Answer FIVE (5) questions only.

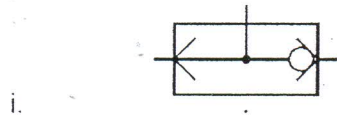
Answer on the answer booklet provided

Question 1

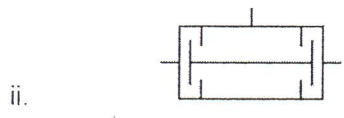
- (a) State two basic characteristic of compressed air.
(4 marks)
- (b) State two advantages of using hydraulics compare to pneumatics technology
(4 marks)
- (c) Explain the differences between laminar and turbulence flow of hydraulic fluids.
(4 marks)
- (d) Name four basic components that normally found in compressed air generation section.
(4 marks)
- (e) State two tasks of hydraulic tank/reservoir in hydraulic system other than for storage of hydraulic fluid.
(4 marks)

Question 2

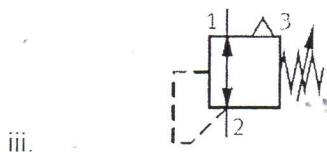
(a) Name the component for the following pneumatic symbols;



(2 marks)



(2 marks)



(2 marks)

(b) Draw the symbols for the following pneumatic components;

i. One way flow control valve

(2 marks)

ii. 3/2 way directional control valve ,single pilot , normally closed

(2 marks)

(c) A double acting cylinder is used to transfer work-pieces in a production machine. If the force needed for both extend and retract strokes is 2000 N and the working pressure used are 6 bars. Determine the suitable piston diameter for the cylinder.

(10 marks)

Question 3

- (a) Draw the symbol for the following hydraulic components;
- 4/3 way directional control valve by lever with detent setting, with pump bypass, return by spring (2 marks)
 - Ball poppet valve (2 marks)
 - Pressure relief valve (2 marks)
- (b) Hydraulic hoses are used to connect the directional control valve and a double acting cylinder in a hydraulic system that has 8.4 l/min oil supply from the power pack. Determine the internal diameter of the hoses if the limit of oil flow velocity is 5 m/s . (6 marks)
- (c) A hydraulic car jack shown in **Figure 1** is used to raise and lower cars in a workshop. It has a compression piston diameter (D_2) of **300mm** and pump piston diameter (D_1) of **60mm**. If the maximum car load on the compression piston is **1500N** and need to be raised by **15mm**, determine the force and stroke needed for the pump piston? Leave your answer in N and mm. (8marks)

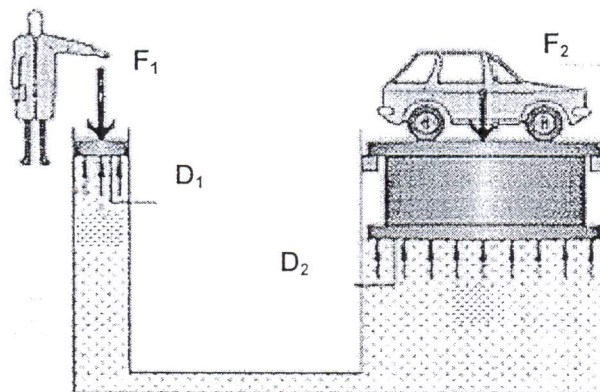


Figure 1

Question 4

(a) Name the relay parts in *Figure 2* below.

(4 marks)

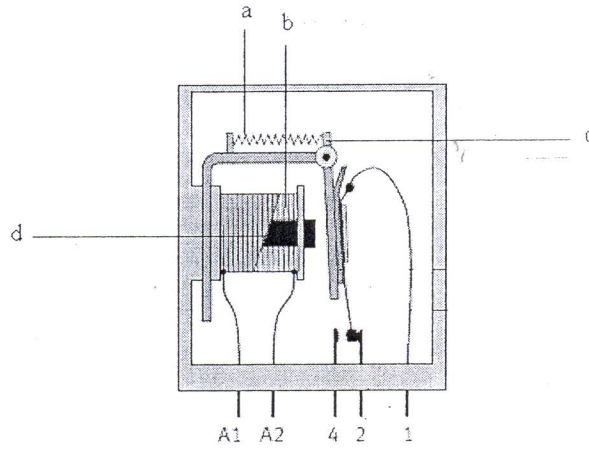


Figure 2

(b) Briefly explain 3 of the main components of hydraulic power pack

(6 marks)

(c) List 3 types of filter arrangement in hydraulic system

(6 marks)

(d) Describe 2 functions of accumulator in hydraulic system

(4 marks)

Question 5

A hydraulic system is used in a production line with circuit diagram shown in *Figure 3*.

Answer the following questions based on the circuit diagram;

- (a) Name the components **1, 2, 3** and **7** (4 marks)
- (b) State the function of component **4** in the system. (2 marks)
- (c) Name and state the function of component **5** in the system. (4 marks)
- (d) Name and state the function of component **6** in the system. (4 marks)
- (e) State one functions of component **8** other than works as storage for pressure medium. (2 marks)

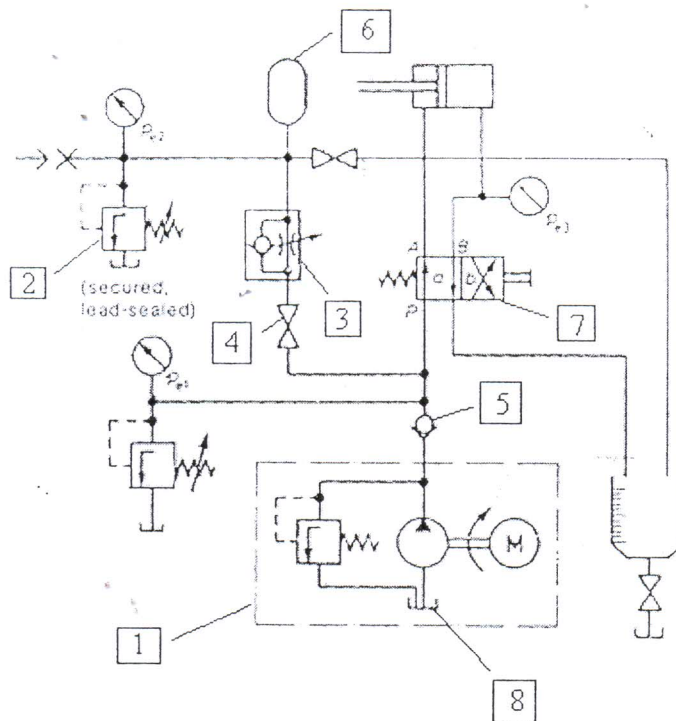


Figure 3

Question 6

Metal blocks and bushes are assembled using a pneumatics system in *Figure 4*. Bushes which are placed ready for assembly in a gravity feed magazine are pressed into metal blocks which are also introduced in a similar manner. **Cylinder A** pushes a metal block from the magazine to a stop and clamps it.

Then, **cylinder B** extends and presses the first bush into place. Next, **cylinder C** is activated, pressing the second bush into place. Then cylinders A and C retract simultaneously, followed by cylinder B retracting. The assembled metal block drops onto a conveyor belt.

- (a) Analyze the displacement step diagram. (3 marks)
- (b) Design the system by using pneumatics technology (17 marks)

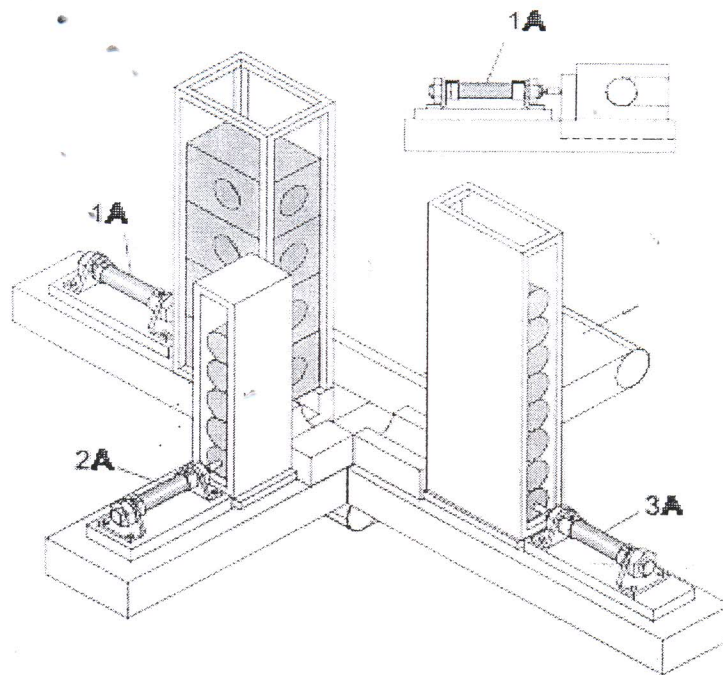


Figure 4

END OF QUESTION