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CONFIDENTIAL

SET A

UNIVERSITI KUALA LUMPUR
Malaysia France Institute

FINAL EXAMINATION
JANUARY 2011 SESSION

SUBJECT CODE	:	FMD 21203
SUBJECT TITLE	:	PNEUMATICS AND HYDRAULICS
LEVEL	:	DIPLOMA
TIME / DURATION	:	9.00am – 11.30am (2.5 HOURS)
DATE	:	12 MAY 2011

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 7 PAGES OF QUESTIONS, EXCLUDING THIS PAGE.

SECTION A (Total: 60 marks)

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

Question 1

(a) Briefly explain the definition of pneumatics.

(4 marks)

(b) Briefly explain the different between pneumatics and hydraulics systems.

(4 marks)

(c) "Cheap or low cost" is one of the pneumatics advantages. Briefly explain.

(4 marks)

(d) Briefly explain the function of **filter** and **regulator** that consist in the service unit.

(2 marks)

(e) State one purposes of using pressure relief valve in hydraulics system.

(2 marks)

(f) State two differences between laminar flow and turbulent flow.

(4 marks)

Question 2

(a) A single acting cylinder with piston diameter **80mm** 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) Determine the pressure of a single-acting hydraulics cylinder with 60mm diameter piston that required to overcome a force of 20 kN?

(Neglect piston weight, friction and spring force)

(10 marks)

Question 3

Two clips are to be riveted together on a semi-automatic press as shown in Figure 1 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. Once the cylinder B retracts to its initial position, the cylinder A then retracts to its initial position. The continuous cycle will starts by actuating a 'Start' pushbutton. It should stops at the end of sequence.

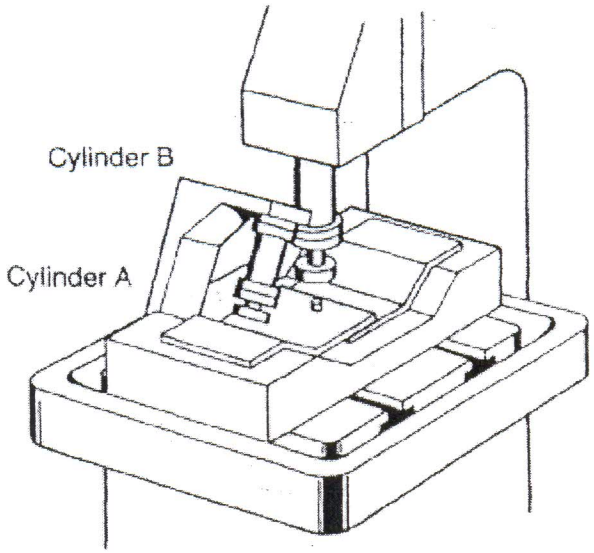


Figure 1

(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

Rectangular parts are stamped on a special machine. The parts are taken from a gravity-feed magazine and clamped by means of a cylinder A, stamped by a second cylinder B and returned immediately then ejected by an ejector cylinder C. Once the cylinder C retracts to its initial position, the cylinder A then retracts to its initial position. The start signal is input by means of a start button. (Refer Figure 2)

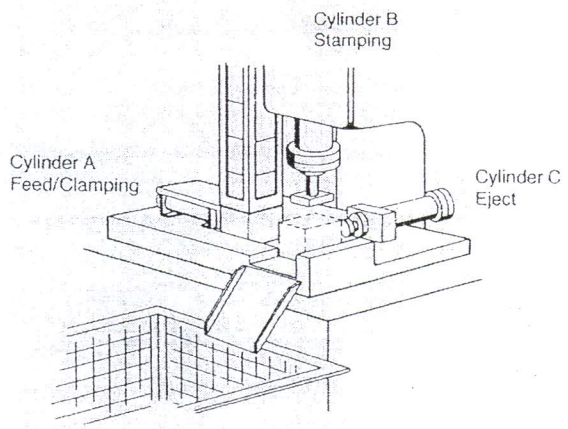


Figure 2

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

(5 marks)

(b) Design a **pneumatic** circuit for the system.

(15 marks)

Question 5

(a) 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;

(i) Name the component 1, 2 and 3

(3 marks)

(ii) State the function of component 3 in the system.

(1 marks)

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

(2 marks)

(iv) State the purpose of component 5 in the system

(2 marks)

(v) State two function of component 6 other than works as a storage for pressure medium.

(2 marks)

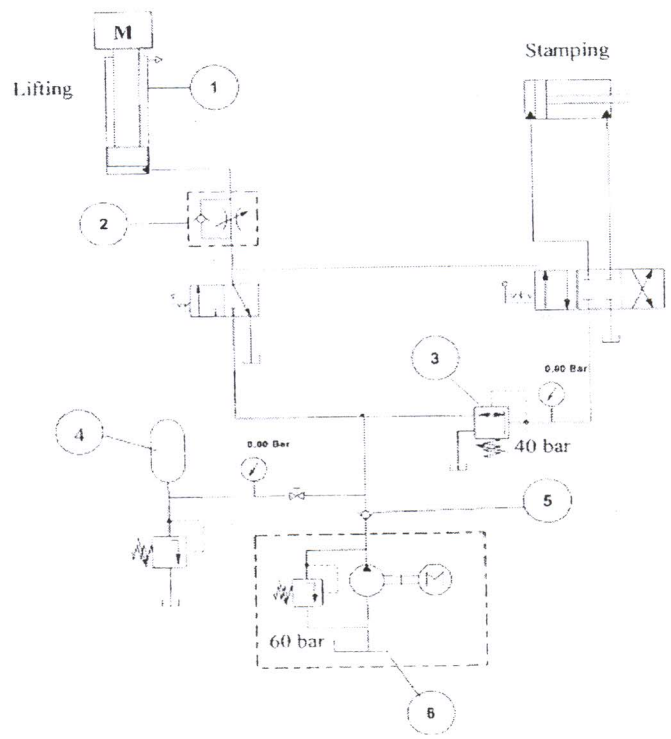
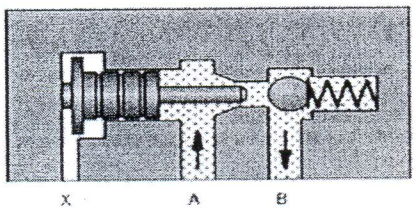


Figure 3

(b) (i) Describe the operation of the figure below during the flow from A to B and during the flow from B to A. (Figure 4)

(2 marks)



Flow from A to B

Figure 4

(ii) State 2 types of stationery hydraulics.

(2 marks)

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

(2 marks)

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

(2 marks)

(v) Describe the operation of pressure relieve valve. (Figure 5)

(2 marks)

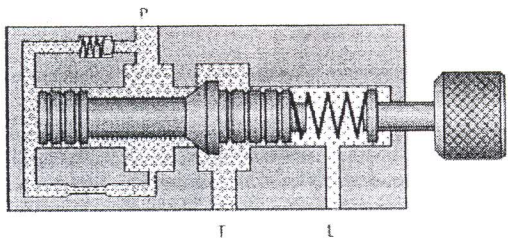


Figure 5

Question 6

(a) A scissor lift (figure 6) is used to lift heavy loads to the platforms of varying heights. The loaded lift must be able to remain at given height over a long period of time. The lift is powered by a double acting cylinder.

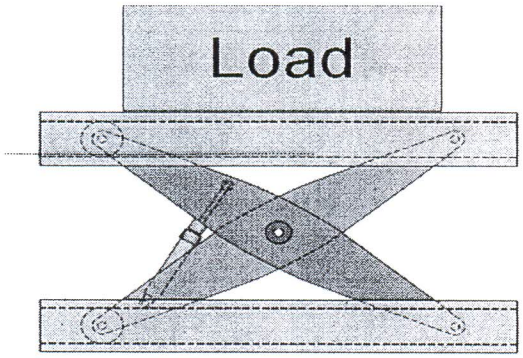


Figure 6

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

(10 marks)

(b) A furnace door is opened and closed by a double acting cylinder shown in Figure 7. The cylinder is activated by a 4/2-way valve with spring return. This ensures that the door opens only as long as the valve is actuated. When the valve actuating lever is released, the door is closes again.

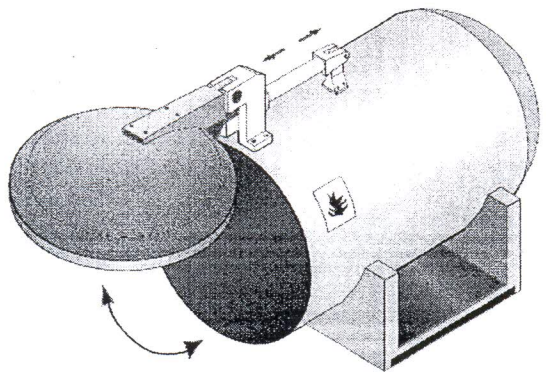


Figure 7

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

(10 marks)

END OF QUESTION