

**UNIVERSITY COLLEGE TATI (UC TATI)****FINAL EXAMINATION QUESTION BOOKLET**

COURSE CODE	:	BMT 3113
COURSE	:	ELECTRO HYDRAULIC
SEMESTER/SESSION:		1 – 2023/2024
DURATION	:	3 HOURS

Instructions:

1. This booklet contains **4** questions. Answer **all** questions.
2. All answers should be written in answer booklet.
3. Write legibly and draw sketches wherever required.
4. If in doubt, rise up your hands and ask the invigilator.

DO NOT OPEN THIS BOOKLET UNTIL YOU ARE TOLD TO DO SO

THIS BOOKLET CONTAINS 6 PRINTED PAGES INCLUDING COVER PAGE

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QUESTION 1

- a) The use of electrical and electronic components in hydraulic systems provides many advantages. Briefly describe the three factors that support this advantage.

(6 marks)

- b) Explain the two principal subassemblies in an electro hydraulic system.

(4 marks)

QUESTION 2

- a) Figure 1 shows a simple hydraulic circuit. Convert the existing circuit to an electro hydraulic system with a direct actuation single solenoid valves.

(6 marks)

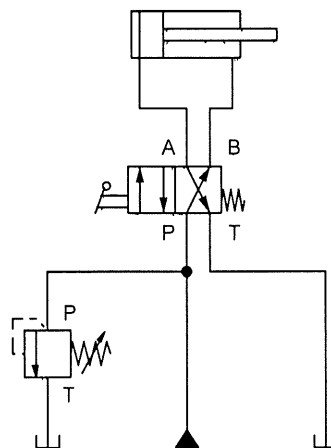


Figure 1

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- b) Figure 2 below shows an electro hydraulic circuit for a particular system. Analyze this circuit by giving a step by step explanation on what will happen to the relay coils, contact, valve and actuator when S1 and S2 button is pressed.

(12 marks)

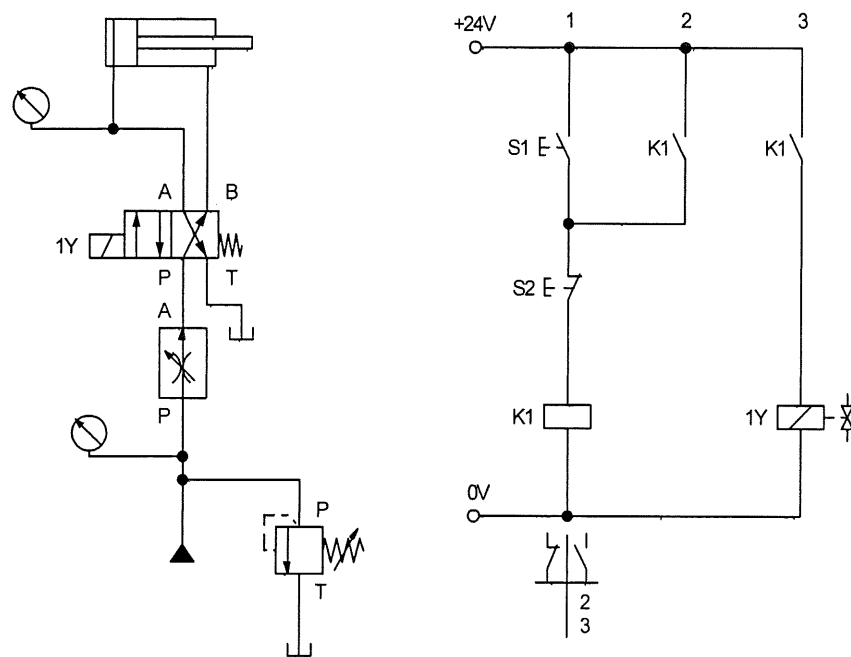


Figure 2

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QUESTION 3

Figure 3 below shows a production system. The edges of workpieces must be chamfered. It has been possible to reduce the machining time by using improved tools. The feed speed is therefore to be increased by using a differential circuit.

The clamping device can accept up to 5 workpieces at the same time. In order to reduce the working stroke when the number of workpieces is less than 5, the cylinder return stroke is to be initiated by an adjustable limit switch.



Install a flow control valve at a suitable point in the circuit so that the effect of the differential circuit can clearly be seen.

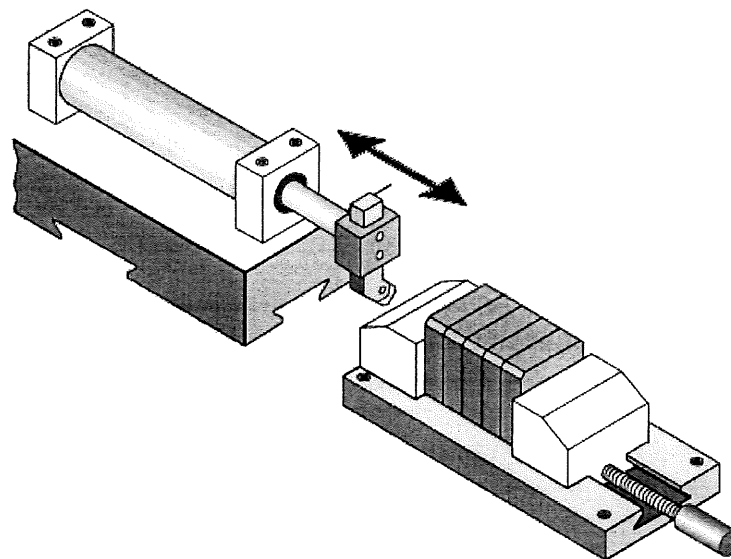


Figure 3

- Classify the required components. (9 marks)
- Produce an electro hydraulic circuit to operate the production system. (9 marks)
- Indicate the numbering of components in the circuit assembly. (9 marks)
- Identify a step-by-step explanation on how the above system works. (9 marks)

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QUESTION 4

Figure 4 below show an assembly device is used to press-fit a plastic bush into a steel workpiece. A screw is then inserted to secure the connection. When the START pushbutton S1 is pressed, the vertical double-acting press cylinder 1A presses the plastic bush into the steel workpiece. When the pressure in the piston chamber of the press cylinder reaches 4.5 MPa (45 bar), the horizontal hydraulic motor 3M screws in the left hand threaded coarse-pitch screw.

When the RETURN pushbutton S2 is pressed, the press cylinder 1A retracts and the motor M stops. The cylinder must not slip when the hydraulic power pack is switched off. Measures must be taken to ensure that the motor cannot rotate clockwise under any circumstances. The speed of the press-fitting motion of the cylinder must be adjustable.

A visual indicator must show the position of the detented RETURN pushbutton S2. The visual indicator must not go out, allowing a re-start, until the switch has been unlocked.

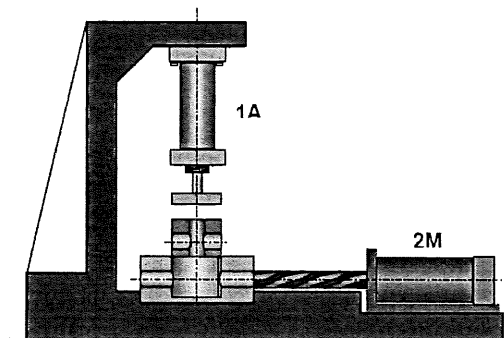


Figure 4

- Classify the required components. (9 marks)
- Produce an electro hydraulic circuit to operate the production system. (9 marks)
- Indicate the numbering of components in the circuit assembly. (9 marks)
- Identify a step-by-step explanation on how the above system works. (9 marks)

-----End of questions-----

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Attachment

