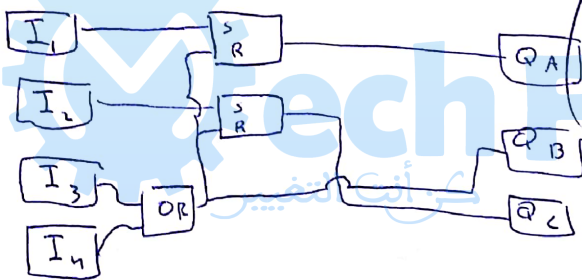
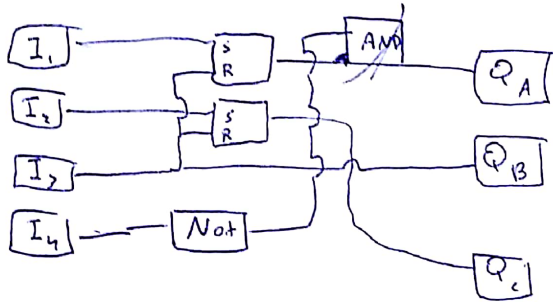
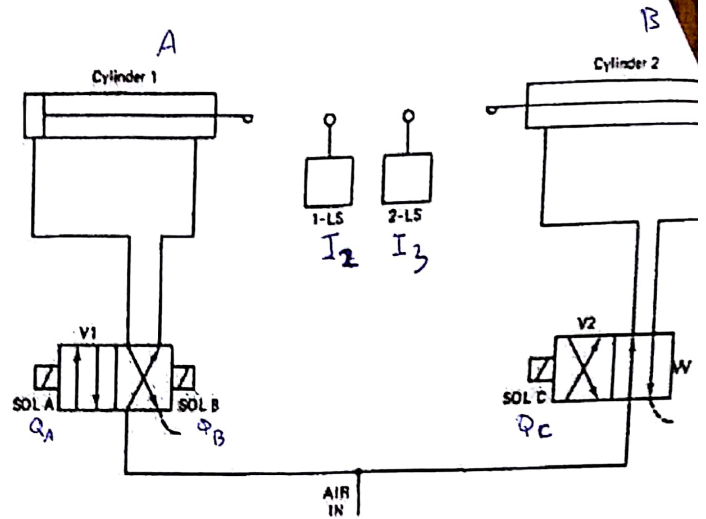


Question One (7pts)

Show work to get partial credit and write neatly.

1. Given the following pneumatic circuit
 - a. Cylinder A extends then B
 - b. Both cylinders retract at the same time
 - c. Add an Emergency button
 Program the circuit using LOGO Blocks



I_1 start button
 I_4 emergency stop
 will reset to initial position

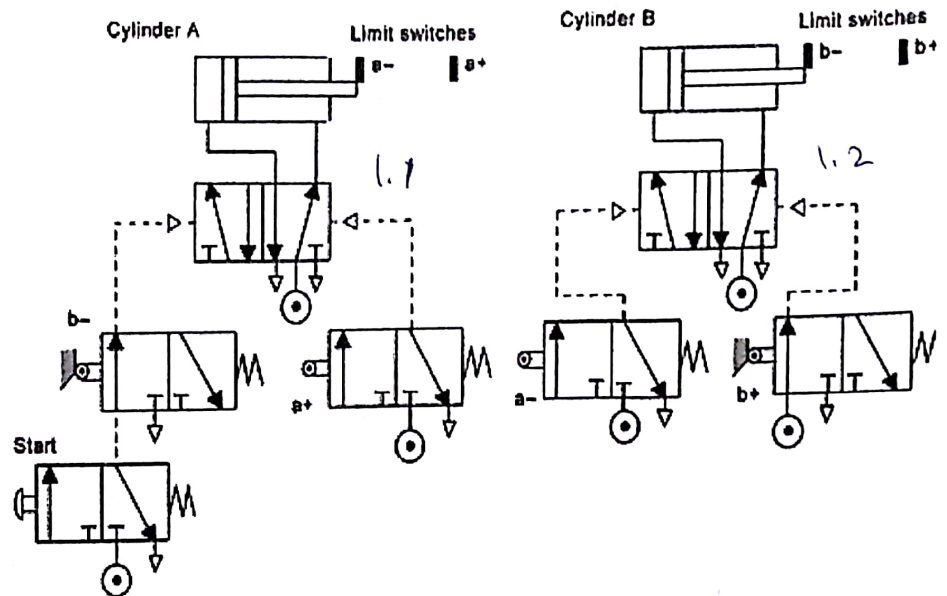
Tables
 -1

Emergency
 -1

Question Two (7pts)

- Describe in steps how the following circuit operates starting with the push button.

$(A + B +)$ $(A - B -)$
 same time same time



at the beginning b^- active
 a^- active

when we push the start button air flows through b^- and into (1.1) pilot line $\uparrow$ left
 (1.1) go to left position and air flows to A and extends it, same for cylinder B.
 at the same time (a^- active, 1.2 left, B extends).

Now b^+ , a^+ active and a^- and b^- are not $\Rightarrow$ air flows through a^+ to 1.1 right pilot
 right position active and A retract, same for cylinder B (b^+ active, 1.2 right,
 B retract at the same time as A)

Question Three (5pts)

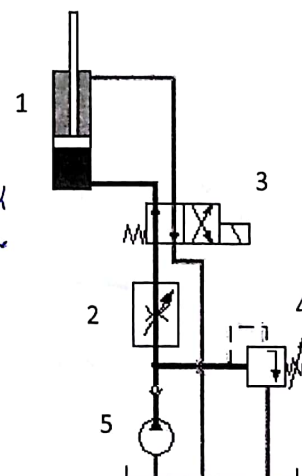
Name all of the components in the following circuit

- Double acting cylinder
- flow control valve
- 4 way / 2 position solenoid actuated spring returned directional control valve

4 - pressure relief valve

5 - hydraulic pump

positive displacement



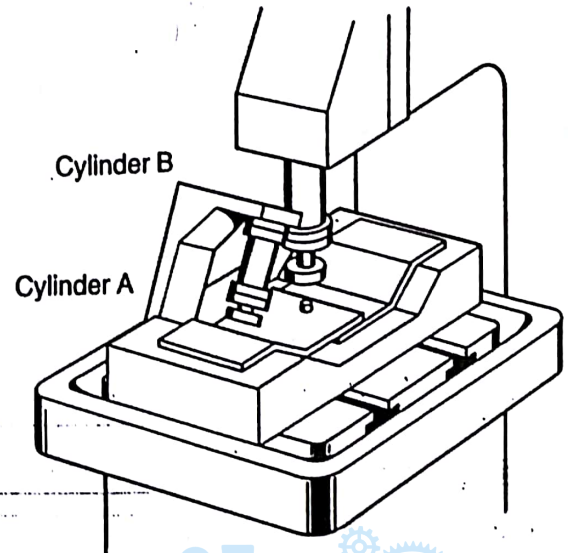
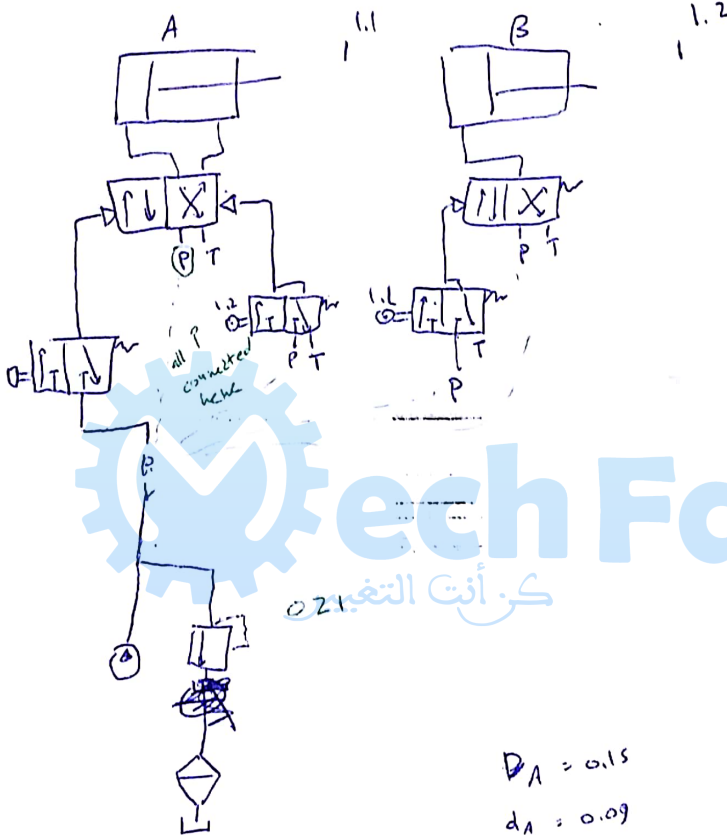
Question Four (6pts)

(A-B+)

Consider the following hydraulic press machine. Two clips are to be riveted together on a semi-automated press. Components and rivet are positioned by hand then removed by hand on completion of the components operation. The automated part of the working cycle consists of the holding and clamping of the components (cylinder A with diameter of 15cm and rod 9cm) and also the riveting (cylinder B with diameter of 15cm and rod 9cm), and the cycle be performed at the starting position after operating a start button. Assuming a yield stress of 10^5 Pa/m^2 and a rivet diameter of 10mm design a complete hydraulic circuit and size all the components.

steps in green

• {A+ B+} (A-B-)



كن أنت التخبلي

$$D_A = 0.15 \\ d_A = 0.09$$

$$D_B = 0.15 \\ d_B = 0.09$$

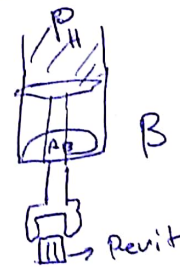
suitable speed for the operation

$$\frac{1}{A_B} = \frac{V}{V} \\ V = 0.5 \text{ m/s} \\ 1 = 8.8 \cdot 10^{-3}$$

So we use a pump with

$$4.118 \text{ watt} \rightarrow \begin{cases} 1 = 8.8 \cdot 10^{-3} \\ \text{and} \\ \Delta P = 600 \text{ Pa} \end{cases} \quad (\text{Factor of safety})$$

Pressure relief valve with $P_{rel} = 444 \text{ Pa}$ to prevent yielding on the Rivet



$$P_{max} = 10^5$$

$$P = \frac{F}{A} \Rightarrow F = 7.85 \text{ N} \\ P_H \times A_B = F_{max}$$

$$P_H = 444 \text{ Pa}$$