WARWICK
School of Engineering

ES2C5 Dynamics & Fluid Mechanics Laboratory
Pneumatics Assessment

Complete this assessment during the Laboratory session.
Hand it in to the academic supervisor before you leave.

Student ID number:	**Date of laboratory session:**
Received by (Staff initials):	**Date (of submission):**

1) SAFETY

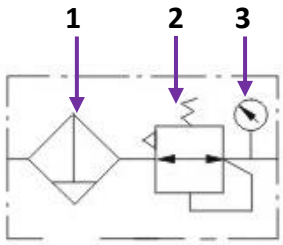
Use the table below to make an assessment of what might happen during the experiment that could cause a safety issue, and what you are doing / can do to control the risk.

Safety Awareness Table

Hazard	Countermeasure

2) Why is important that the air quality supplied to the system is free from dust and moisture?

3) What do the symbols represent on the trainer board where the main air line is connected?

	1 2 3

4) Exercise 1

i) What is the magnitude of the force exerted by the actuator (cylinder 2A) at full extension? (Show your calculations)

ii) What is the magnitude of the force exerted by the actuator when fully retracted? (Show your calculations)

i) Force when extended	i) Force when retracted

5) Exercise 2

i) What is the magnitude of the force exerted by the actuator (cylinder 3A) at full extension? (Show your calculations)

ii) What is the magnitude of the force exerted by the actuator when fully retracted? (Show your calculations)

ii) Force when extended	ii) Force when retracted

6) Estimate the likely uncertainty in these calculated forces?
What is the main contributor to this uncertainty?

7) Exercise 4

Complete the truth table for the operation of this circuit

S1	S2	1A
0	0	
0	1	
1	0	
1	1	

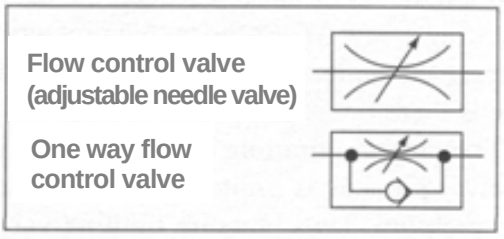
Write down the Boolean logic equation for the operation shown in Figure 6 of the briefing sheet.

8) Exercise 5

Draw and label the pneumatic circuit diagram showing your set up for this operation.

9) Exercise 6

Both cylinders 1A and 3A incorporate needle and check (one way flow control) valves on their connectors. Explain how these work to control the speed of actuation of the cylinders. *Attempt ex.6 before answering!*



10) Normally pneumatic valves are actuated by solenoids triggered by electrical signals sent from a microprocessor controller (e.g. Programmable Logic Controller). The trainer uses air instead for ease of use and safety. Give an example of where pneumatic powered valves may be more desirable than using electrical solenoids powered valves to control a pneumatic circuit and explain why.

11) Why might large pneumatic systems be considered particularly hazardous?
(What is dangerous about such systems?)

12) What other disadvantages are there of using pneumatic actuators instead of electrical/hydraulic actuators? (Give 2)