

8. Pneumatics Past Paper Problems

2019 Q3

1. Pneumatic circuits can use both main air and pilot air.

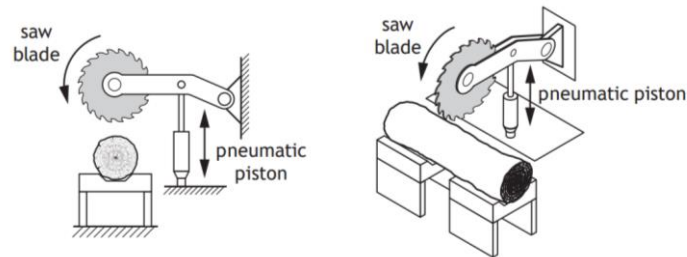
Describe the function of

- main air
- pilot air

1
1

2019 Q10

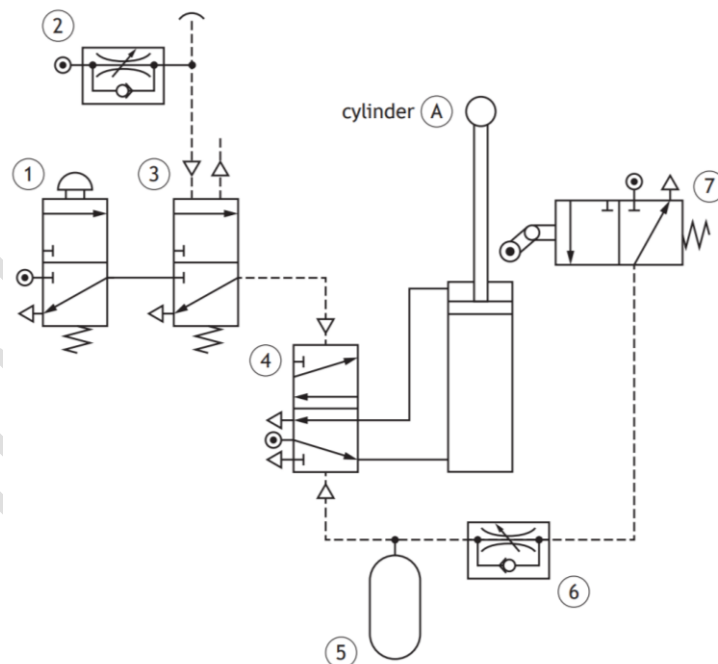
2. A pneumatic circuit is used in the operation of an industrial saw.



- State, with reference to the diagram above, the type of motion shown at the:
saw blade
pneumatic piston

2

The pneumatic circuit used to control the movement of the saw is shown below.



- Describe the operation of the circuit shown below.
When an increase in pressure is detected by valve 3 . . .

3

The piston is to be instroked slowly and smoothly.

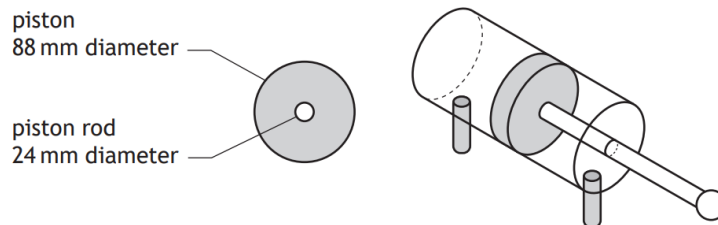
- Indicate on the circuit shown opposite, with an X, where a uni-directional restrictor should be connected.

1

The roller trip on valve 7 is to be replaced with a solenoid and components 5 and 6 are to be removed. The solenoid will receive a signal from a microcontroller based circuit when the piston instrokes.

- d) Describe an advantage of using a microcontroller to control the movement of the piston. 1

The pneumatic cylinder used in the system is shown below.

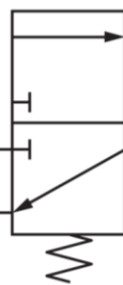


e)

- i. Calculate the effective area of the piston when it instrokes. 3
 ii. Calculate the force applied by the piston when it instrokes if air is supplied at a pressure of 0.20 N mm^{-2} . 3

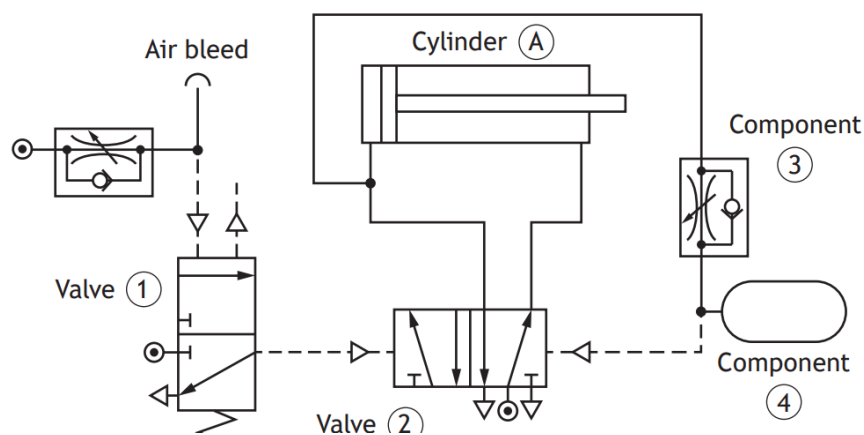
2018 Q7

3. Complete the pneumatic symbol shown below for a 3/2 solenoid spring return valve.



2018 Q15c

4. Portions of the pastry travel along a conveyor belt where a pneumatic piston presses them into pie casings. The pneumatic circuit shown below operates the piston when the pastry is sensed in position.



- a) Describe, using appropriate terminology, the operation of the pneumatic circuit, shown above. 3

When the air bleed is covered valve 1 is actuated

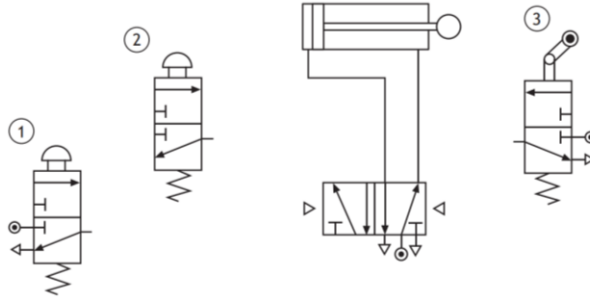
- b) Explain why an air bleed was selected as an appropriate way of sensing the pastry. 2

- c) The piston has a cross sectional area of 810 mm^2 and produces a force of 73 N .
Calculate the pressure supplied to outstroke the piston.

2

2017 Q6.

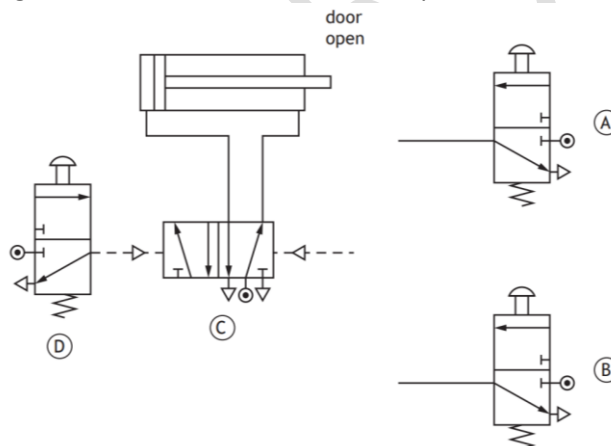
5. A pneumatic circuit used to crush materials in a recycling factory is shown below.
The piston should only outstroke when valve 1 and valve 2 have been actuated. It will then instroke when valve 3 has been actuated.
Complete the piping of the pneumatic circuit shown below.



2016 Q4

6. A pneumatic door in a factory is being designed.

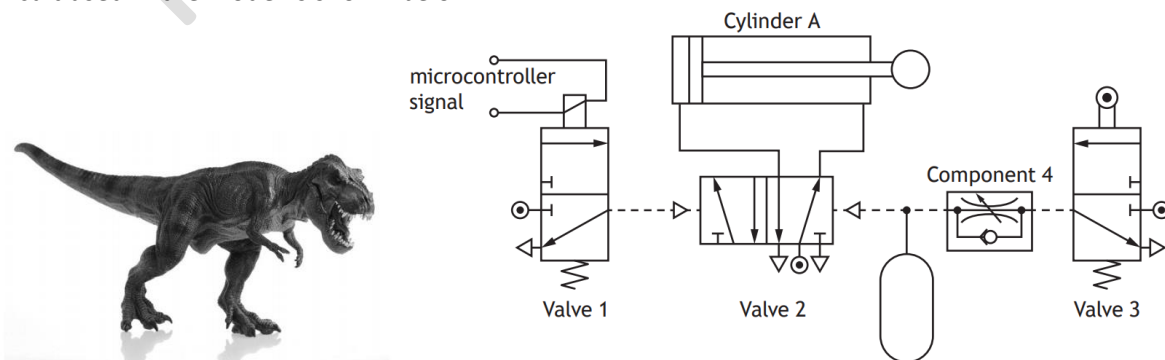
- a) Complete the diagram below to allow the door to open when valve A or B is actuated.



- b) State the name of the type of actuator used to control valve C

2016 Q12

7. A mechanical model of a dinosaur uses pneumatics to control its movement. Part of the pneumatic circuit used in the model is shown below.

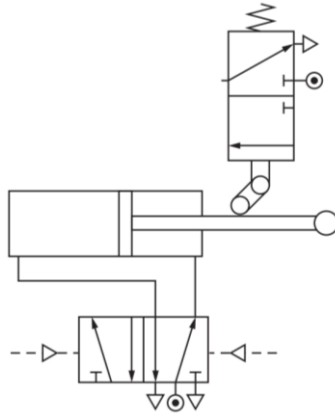


- a) Describe, using appropriate terminology, the operation of the circuit. 3
When a signal is sent from the microcontroller
- b) The circuit is to be altered so that the piston instrokes slowly. 1
 Indicate, with an X, on the pneumatic circuit where a unidirectional restrictor should be connected.

2015

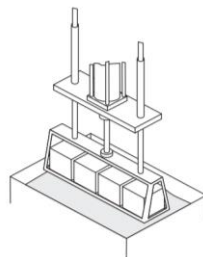
Q6.

8. An incomplete pneumatic circuit to produce reciprocating motion is shown in the diagram below. Complete the diagram by inserting the missing piping. 2

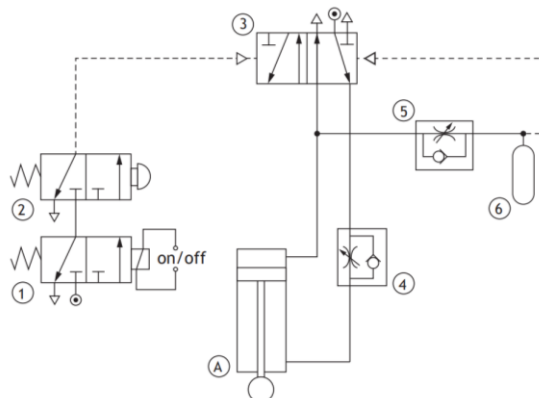


2015 Q14

9. A pneumatic system used to lower metal components into an acid bath to be cleaned is shown below.



The pneumatic circuit used is shown below.



- a) Describe the operation of the pneumatic circuit. 4
When Valve 1 is actuated . . .