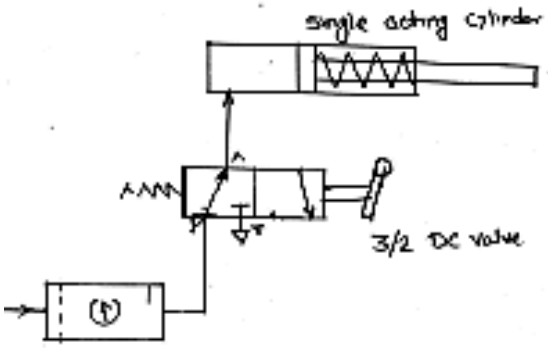
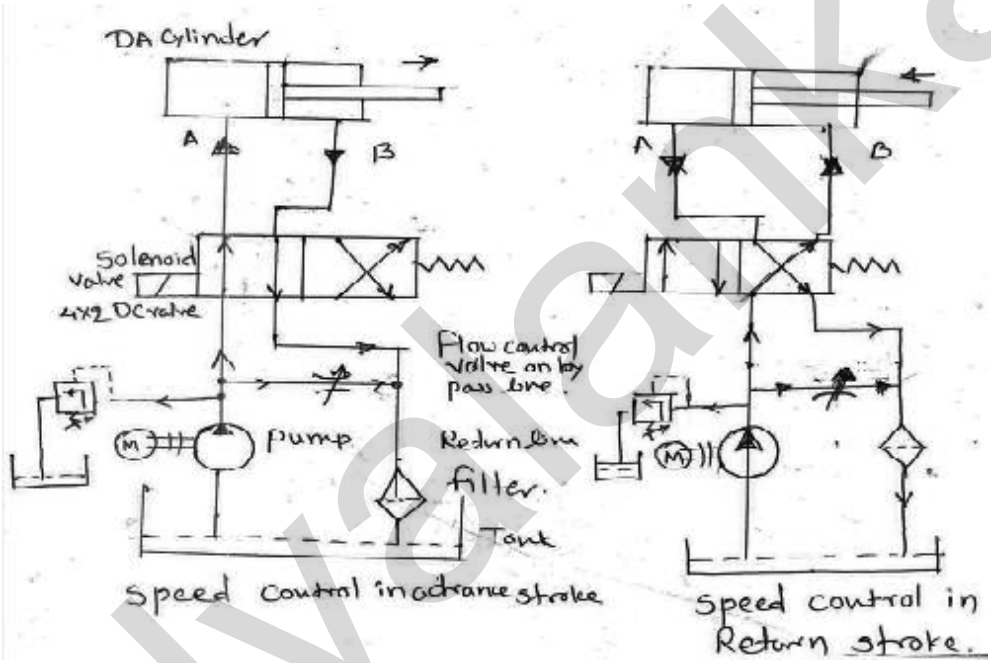
The following circuit shows use of 3/2 DC valve.
When the lever is operated, port A is connected to exhaust port ,i.e change in direction of the piston.
(Alternative sketch can be considered)



Q.4(a) (ii) Draw bleed off circuit and label it. [4]

(A)



Q.4(a) (iii) What are the limitations of pneumatic system? [4]

(A)

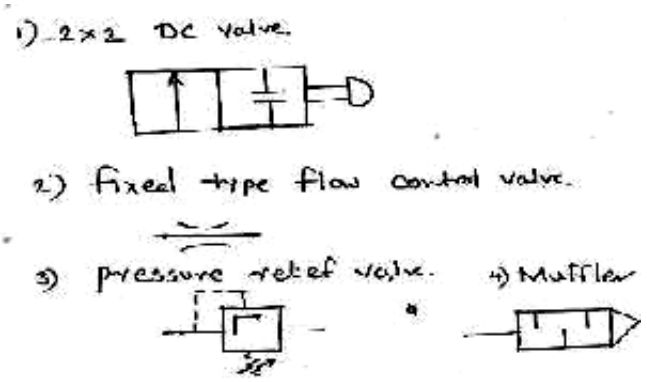
1. Relatively low accuracy: As pneumatic systems are powered by the force provided by compressed air, their operation is subject to the volume of the compressed air. As the volume of air may change when compressed or heated, the supply of air to the system may not be accurate, causing a decrease in the overall accuracy of the system.
2. Low loading: As the cylinders of pneumatic components are not very large, a pneumatic system cannot drive loads that are too heavy.
3. Processing required before use Compressed air must be processed before use to ensure the absence of water vapour or dust. Otherwise, the moving parts of the pneumatic components may wear out quickly due to friction.
4. Uneven moving speed: As air can easily be compressed, the moving speeds of the pistons are relatively uneven.
5. Noise: Noise will be produced when compressed air is released from the pneumatic components.
6. Lubricator: Lubricator is required to add lubricant oil to compressed air to reduce friction.

Q.4(a) (iv) Draw symbol of : **[4]**

(1) 2 × 2 DC valve **(2) Fixed type flow control valve**

(3) Pressured relief valve **(4) Muffler**

(A)

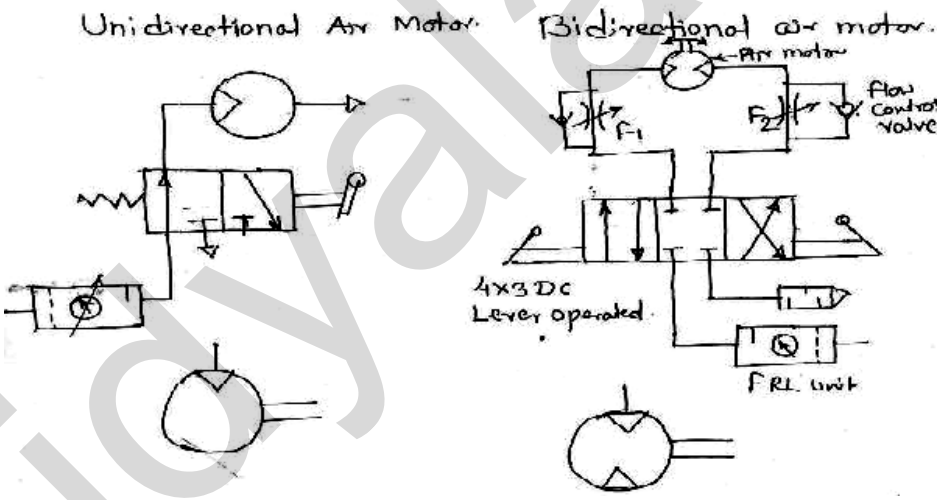


Q.4(b) Attempt any ONE of the following : **[6]**

Q.4(b) (i) What is the meaning of unidirectional air motor and bi directional air motor? Explain with sketch and draw symbol of both. **[6]**

(A) Operating or moving or allowing movement in one direction only. It runs in one direction only. It does not run in the other direction. Unidirectional motor can be operated by using 3/2 DC valve as shown in fig.

Bidirectional air motor: Functioning or allowing movement in two usually opposite directions. It can runs in both direction. Bi-directional motor can be operated by using 4/3 DC valve as shown in fig.



Q.4(b) (ii) Compare linear actuators and rotary actuators. **[6]**

(A)

	Linear Actuators	Rotary actuators
1.	These actuators reciprocates in a cylinder	These actuators rotate about center.
2.	Linear speed measured in m/sec	Rotary speed measured in RPM
3.	Example-Single acting cylinders, double acting cylinders, Tandem cylinder	Example-Vane motors, gear motors, piston motors, air motors
4.	Used for pushing ,pulling types of tasks	Used where rotary motions are required. Straight grinders, pistol drills.
5.	Provide motion along straight line	provide motion along center
6.	Manufacturing cost is High	Manufacturing cost is low

Q.5 Attempt any TWO of the following : **[16]**

Q.5(a) What is function of filter? How filters are classified? Name any four advantage of bypass filter? **[8]**

(A) The main function of the hydraulic filter is to remove the dust particles from the high pressure hydraulic oil.

Following are the ways to classify a filter

A) Classification according to function

1) Surface type
2) Edge type
3) Depth type.

B) Classification according to construction

1) By pass type filter
2) full flow filter
3) Proportional flow filter
4) Indicator type filter

Following are the main advantage of By–pass type filter

1) The filter element is sale guarded against any damage due to high pressure.
2) It passes the fuel to the system even after the filter is saturated.
3) The filter can be reused.
4) The valve can be used to made. Direct connection when filter is racked up.

Q.5(b) Sketch the two positions of sliding spool type 3/2 DCV and explain in brief? **[8]**

(A)

i) 3/2 DCV are mostly to operate single acting cylinder and unidirectional motors.

ii) In the first position a spool there is a connection from part–P to part–A, oil flows from pump to single acting cylinder.

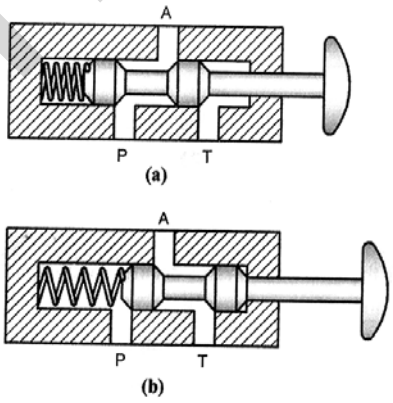
iii) Thus extending a single acting cylinder and port-T is closed.

iv) The spool is shifted in 2nd position by using a push button.

v) In its second position there is a connection from port–A to port–T.

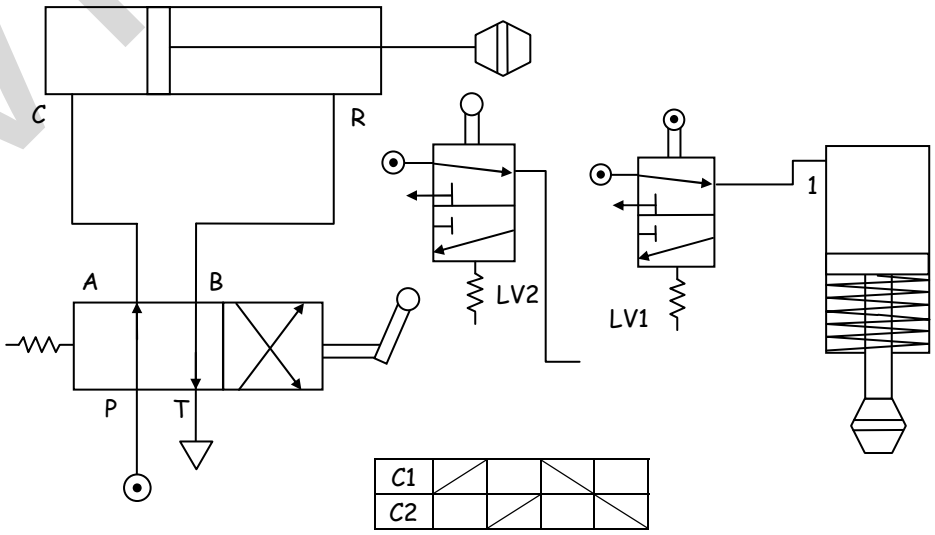
vi) Thus oil starts flowing from single acting cylinder to tank.

vii) Hence the single acting cylinder retracts and inlet port–P is closed



Q.5(c) Develop a pneumatic circuit for operation of two DAC such that one operator after another. **[8]**

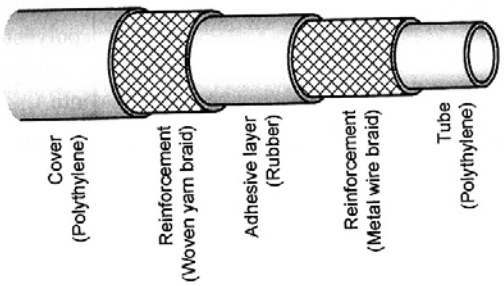
(A)



Q.6 Attempt any FOUR of the following : [16]

Q.6(a) Describe with neat sketch the construction and function's of pneumatic hose? [4]

(A)



i) The construction of pneumatic hose consist of several layers with metal wire braiding between them.
ii) Those metal wire reinforcement increase the strength of the pipe.
iii) These layers are having various functions as follows.
iv) Tube : It is used to covey hydraulic compressed air.
v) First reinforcement :- It is used to protect and increase the strengthens of the tube.
vi) Adhesive layer : Hold the reinforcement layer together and protects against vibration.
vii) Second reinforcement :- used to protect first reinforcement.
viii) Outer cover :- Used to protect from abrasions dust, vibrations, sunrays.

Q.6(b) State the application of Pneumatic System? [4]

(A) Following are the application of pneumatic systems :

1) Pneumatic tools : drilling machine, screw driver, nut runner, jack hammer etc.
2) Packing systems : Used in packaging industry
3) Machine Tools : Pneumatic Press, Pneumatic drilling Machine, Clamps, vices etc.
4) Automobiles :- Air Brake, Air Suspension.
5) Medical and dental equipment :- dental chair, operating table.
6) Agriculture equipment: Shears
7) Mining: Pneumatic hand tools are extensively employed in mines

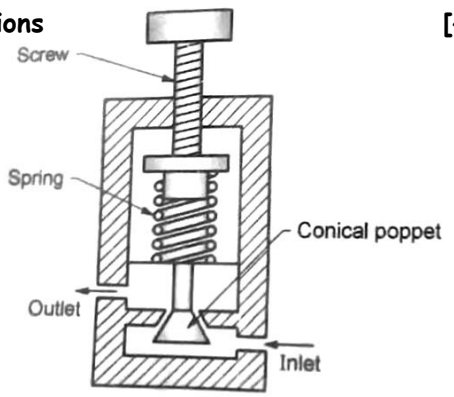
Q.6(c) Distinguish between pressure relief valve and unloading valve? [4]

(A)

	Pressure relief	Unloading valve
1)	Its inlet itself is its pilot connection.	It has a separate pilot connection.
2)	It is set for maximum pressure required for operation of the system.	It is set for the minimum pressure required during idle period of the system.
3)	It opens when its inlet pressure (maximum system pressure) increases above preset value.	It opens when the pilot pressure (minimum idle-period pressure) increases above preset value.
4)	It is safety valve which avoids damage to the system components due to high pressure.	It avoids over heating of oil, and It saves power to a greater extent.

Q.6(d) For the given component answer the following questions [4]

(i) Write the name of shown component
(ii) Name the parts denoted by around
(iii) Give it's application
(iv) Draw the symbol.

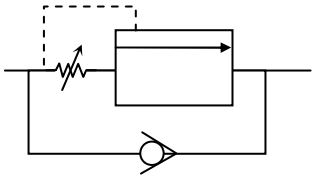


(A) i) Sequence valve.

ii) 1) Adjusting screw
2) Conical Copper

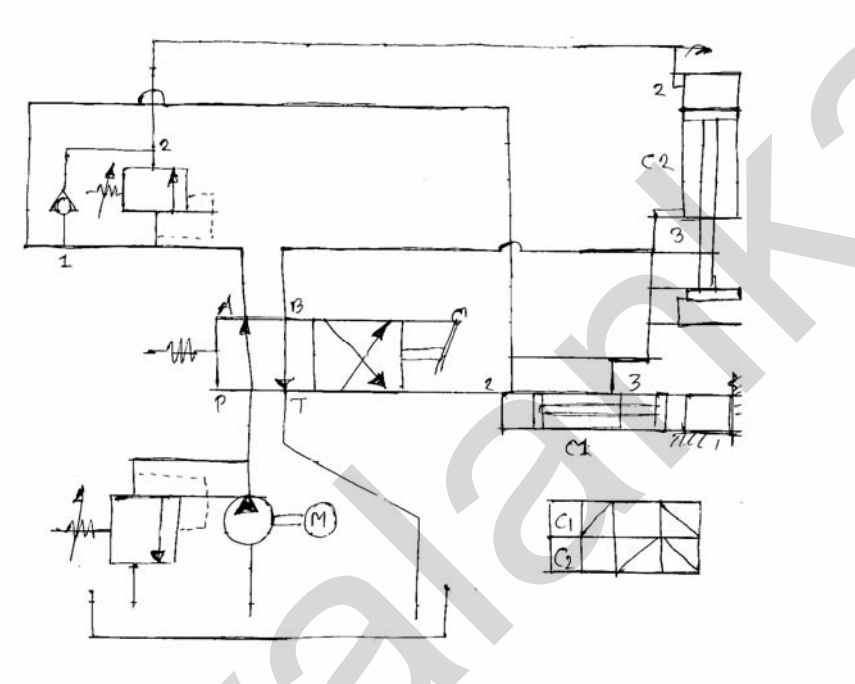
iii) To operate DAC in a sequence.

iv)



Q.6(e) Draw a Sequencing Circuit for two DAC. Stamping Circuit. **[4]**

(A)



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