



1. Define pneumatic system.

Pneumatic systems are one which uses pressurized air as a medium to transmit and control power.

2. Name three reasons for considering the use of pneumatics instead of hydraulics.

As the name implies pneumatic systems typically use air as the fluid medium, because air is a safe, low-cost and readily available fluid. Liquids exhibit greater inertia than do gases and hence the problem of accelerating and decelerating actuators and opening and closing valves gets eliminated in pneumatics. Also pneumatic systems are less expensive than hydraulic systems.

3. Name three types of air compressors.

1. Piston compressor
2. Vane compressor
3. Screw compressor

4. Describe the function of air filter.

The function of the air filter is to remove contaminants from air before it reaches the pneumatic components such as valves and actuators.

5. Why a lubricator is used in pneumatic system?

The function of the lubricator is to insert drops of oil into the air stream and hence facilitates the lubrication of moving parts.

6. What is the function of muffler in pneumatic system?

A pneumatic exhaust silencer called muffler is used to control the noise caused by the exhausting air stream.

7. What is the function of compressors?

A compressor is a machine that compresses air or gas from a low inlet pressure to a higher desired pressure level. This is accomplished by reducing the volume of the gas. Air compressors are generally positive displacement units and are either of reciprocating piston type or the rotary screw or rotary vane types.

8. What is called hydropneumatics?

Hydro pneumatics combines two fluids – air and the oil for the power transmission. By the use of the two media, the quick action of air and the smooth high pressure action of oil blend can be utilized in hydropneumatics.

9. List the hydro pneumatic appliances.

The hydro pneumatic appliances are,

1. Air-oil reservoir
2. Air- oil cylinder
3. Air- oil intensifier

10. Write the applications of air motors.

They may be used in conjunction with hydraulic power units, bench grinders, conveyer belts, agitators and mixers, feeding devices, hoists, machine feeders, pipe threaders, tool devices, vibrators and many others.

11. Compare the hydraulic and pneumatic circuits with respect to their characteristics (Ap-May-04).

The liquids exhibit greater inertia than gases and hence the force required to accelerate oil is greater than air. The liquids exhibit greater viscosity than gases and hence results in larger frictional pressure and power losses. Due to compressibility of air, it is impossible to obtain a precise control of actuator velocities in pneumatic systems. The hydraulics can be used in high power systems whereas pneumatics are confined to low power applications

12. Name the methods used for designing pneumatic circuits.

1. Classic method
2. Cascade method
3. Step-counter method
4. Logic design method (with Karnaugh – Veitch maps)
5. Combinational circuit design.

13. What is F-R-L and what is the function of a lubricator?

FRL means Filter, Regulator and Lubricator. The lubricator lubricates the moving parts of the pneumatic system and eliminates the friction.

14. What is a Pneumatic Vacuum System?

When a vacuum air pressure is used to perform useful function, the system is called as Pneumatic Vacuum System. Industrial applications like material handling, clamping, sealing and vacuum forming are uses this kind.

15. What is the function of pneumatic shuttle valve?

The pneumatic shuttle valve automatically selects the higher of the two input pressures and connects that pressure to the output port while blocking the lower pressure.

16. What is the function of AND type valve?

In this valve an output is produced if both the input signals are fed.

17. What is the use of quick exhaust valve?

The return air from the cylinder will exhaust directly to the atmosphere without passing through the DCV.

18. What is the use of time delay valve?

This valve is used in the pneumatic system to initiate a delayed signal.

19. Name the materials used for making the pneumatic cylinders.

Pneumatic cylinder construction makes extensive use of aluminum and other non-ferrous alloy materials to reduce the weight and the corrosive effects of air and to improve heat transfer capabilities.

20. What are air motors?

To generate rotary motion in a pneumatic system an air motor is used.

21. How does a hydro pneumatic system differ from hydraulic system?

In the hydro pneumatic system both air and oil are used to do the useful work.

22. What are the basic components of logic controls?

The basic components of logic controls are sensors and switching elements called binary elements.

23. What are the advantages of pneumatic logic controls?

They are,

- a. Used in specialized applications like explosive environments.
- b. Simple in design.
- c. Having higher response than electrical systems.
- d. Durable than electrical systems.

24. Name pneumatic position sensors.

Pneumatic limit valves, back pressure sensor, proximity sensor, gap sensor and limit switch.

25. What is the use of pressure sensors?

When the preset pressure level is reached, the pressure sequence valve provides a signal. This in turn can be used for further switching combinations.

26. What is a solenoid?

A solenoid is an electromechanical device which can convert electrical signal into mechanical force and motion.

27. What are relays?

Relays are used for energizing and de-energizing solenoids which operate at high current level.

28. What is the use of timers?

Timers are used to control the time duration of a working cycle. In this way a dwell can be provided when needed.

29. When is the pneumatics preferred over hydraulics?

Pneumatics is preferred over hydraulics when the high speed and lower forces are required and do not require high precision.

30. What is a multistage compressor?

A compressor that draws in air and compresses it to its final pressure in two or more stages is called a multistage compressor.

31. What is the purpose of a pressure regulator?

The purpose of pressure regulator is to regulate the incoming pressure to the desired pressure.

32. State the difference between quick exhaust valve and flow control valve.

The flow control valve is used to reduce the actuators speed from its normal speed. But quick exhaust valve accelerates the speed of the actuators.

33. Why air cylinders cannot be used for precise speed control?

Due to the compressibility characteristic of an air, the air cylinder tends to slow down on meeting increase in load and to accelerate when the load suddenly decreases. So air cylinders cannot be employed for precise control.

34. Classify the pneumatic cylinders based on principle.

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|---------------------------|-------------------------------|
| 1) Single acting cylinder | 2) Double acting cylinder |
| 3) Tandem cylinder | 4) Three position cylinder |
| 5) Through Rod cylinder | 6) Adjustable stroke cylinder |
| 7) Telescoping cylinder | |

35. Where is the suction cups used?

Suction cups can be used to pickup and hold work pieces with smooth and impervious surfaces. They are commonly used in pick and place application in industries like glass, TV, sheet handling, packaging etc.

UNIT -V

1. What are all the basic requirements for a trouble free hydraulic system?

The basic requirements are,

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|-----------------------------------|--------------------------------|
| 1. Properly installed equipments | 2. Properly trained personnel |
| 3. Planned preventive maintenance | 4. Efficient trouble shooting. |

2. What is called trouble shooting in a hydraulic system?

The term trouble shooting means an organized and systematic study of the problem and a logical approach to the difficulty faced in the system.

3. What do you understand by the term power pack? (Ap-May-04)

The power pack is a centralized hydraulic system in which the pump, electric motor, reservoir associated valving assembled to supply pressurized fluid. They are relatively small in size and provide pressure, flow and direction control within this basic package.

4. List different types of pressure switching elements.

Pneumatic valves, pneumatic moving part logic (MPL) and fluidic elements.

5. What are moving part logic elements?

They are using moving parts such as diaphragms, springs, disks, balls and poppet and hence they are called so.

6. What are non moving logic controllers?

The fluidic elements are called nonmoving logic elements.

7. What is the use of ladder diagram?

The ladder diagram is the representation of hardware connections of electrical components (Switches, relays, solenoids, etc..) of a circuit. In Ladder diagrams the power connected to the left leg and the ground connected to the right leg.

8. What are the advantages of fluidic elements?

The advantages are,

1. No wear and tear of elements.
2. No actuating force needed.
3. Very little space needed for mounting
4. Quite insensitive to temperature, vibration, shock, electric noise and radiation.

9. List the electrical devices commonly used for the control of fluid power systems.

1. Switches
 - a. push button switches
 - b. pressure switches
 - c. limit switches
 - d. temperature switches.
2. Solenoids
3. Relays
4. Timers

10. List the basic elements of PLC construction.

The three basis elements of PLC are,

- Central processing unit Input modules Output modules.

11. List the various approaches for entering program into the PLC.

There are various approaches for entering the program into PLC,

1. Ladder diagram
2. Low level language based on Boolean expressions.
3. Functional blocks.
4. High level languages.

12. What is called interfacing?

The means of effecting the connection between items which are not directly compatible is called interfacing. For example the microcomputer is incapable of driving the solenoid directly and an interface is needed.

13. What is the draw back of interruptible jet sensor?

The draw back of Interruptible jet sensor is that only thin objects can be sensed. Also the output pressure obtainable is very low and so amplification is generally needed.

14. What is the advantage of proximity sensor?

The proximity sensor permits the detection of objects at greater distances than what is possible with back pressure sensors.

15. What is OR MPL element?

OR MPL element is one which permits an output either one or both inputs are given. It is a shuttle valve using poppet disk instead of a ball.

16. What is the advantage of hydro pneumatics?

By the use of two medias, the quick action of air and the smooth high pressure action of oil provides added advantage in hydro pneumatics.

17. What is the use of NOR and AND gates?

NOR gate is used to determine when none of the control signals are present, where as the AND gate is used to determine when all the control signals are present.

18. What is the reason for insufficient pump delivery?

The reasons are may be due to clogged strainer, insufficient capacity strainer, oil leak in the pump, low level of oil in the reservoir.

19. What is called trouble shooting chart?

A trouble shooting chart is one which shows the complete details of trouble, possible causes and remedies. An operator can easily identify and rectify the problem with the help of this chart.

20. What is the reason for frequent packing failure of cylinders?

The improper mountings will cause damage of the packing very soon.

21. What is the reason for relief valve failure?

The relief valve may fail due to dirt present in oil, due to worn-out poppet and due to piston sticking in the main body.

22. What is preventive maintenance?

With the help of periodical maintenance schedule, the components are maintained in good condition before the problem arises and hence it is called as preventive maintenance.

23. Identify any three reasons for the excessive noise of pumps.

The reasons may be due to,

- Misalignment of pump and prime mover.
- Air remains in pump casing
- Very high viscosity

24. What may be the reason for faulty shifting of DCV?

The reasons may be due to, worn out control linkage, insufficient pilot pressure, burnt out solenoid etc.

25. What are the causes for the failure of unloading valve?

The unloading valve may fail due to, too high valve setting, too low remote pressure and valve spool binding in body.

26. What will happen if fluid stream is blocked with partial obstruction?

The oil may get heated and the pump will be over loaded.

27. Identify the reasons for excessive pressure drop through the filter.

The pressure drop through the filter may be due to, undersized filter and dirty filter element.

28. What may be the reason for the presence of moisture in downstream air?

The reason for the presence of moisture in downstream air may be due to, too high dew point of air and the filter bowl might collected too much water.

29. What are the reasons for air cylinder failing to move the load?

The reasons may be due to,

- | | |
|-------------------------------|---------------------------|
| 1. binding in machine linkage | 2. pressure too low |
| 3. cylinder undersized | 4. piston rod broken etc. |

30. What will be the reason for the air motor not running?

The reasons may be due to,

1. Air pressure too low
2. Insufficient lubrication
3. Rotor rubbing

31. What are the important points to be remembered while installing a compressor for pneumatic system?

The following points are to be remembered while installing a compressor for pneumatic system,

1. The compressor intake should be taken from the outside air
2. The open end of intake pipe must be well hooded and screened to prevent rain and dirt from entering.
3. The intake pipe should be as short as possible.
4. The piping should be sloped away from compressor with sufficient pitch to prevent the condensate or oil drainage back in to the compressor.

32. State the procedures to be adopted for the systematic search for the faults.

The fault finding procedures are,

1. Collecting initial information from operator.
2. initial check on the machine
3. making fault diagnosis
4. rectification of faults using trouble shooting charts

33. If the pneumatic cylinder has erratic motion, name the causes.

The causes are due to, valve sticking or binding and cylinder sticking or binding.

34. What are the reasons for chatter and vibration of FRL unit?

Then reasons may be due to, load instability, regulator response to load changes is too fast etc,

35. What may be the reason for airlock in hydraulic system?

The reason for airlock in hydraulic system may be due to entry of air into the pump and some external leakages in the pipe lines.

36. While installing valves what should be remembered?

While installing the valves the drain connections should be properly connected to the reservoir, so that it will not be subjected to surge pressure.

37. While installing pipes what should be remembered?

While installing pipes, heavy components, valves, filters etc., should be bolted down and not supported by the pipe work.

38. Identify the reasons for internal leakages around the pump.

The reasons for internal leakages around the pump may be due to worn out shaft packing and damaged top cover packing.

39. What are reasons for the erratic timing of sequence valves?

The erratic timings of sequence valves may be due to,

1. faulty piston seal
2. excessive lubrication
1. fluctuating air pressure
4. Accumulated water.

45. What is the meaning of “troubleshooting”?

The term troubleshooting means an organized and systematic study of the problem and a logical approach to the difficulty faced in the system.

46. List five things that can cause a noisy pump.

- 1) Misalignment of pump and prime mover.
- 2) Air remains in pump casing
- 3) Pump bolts vary loose
- 4) Very high viscosity of oil
- 5) Pump running too fast

47. List three causes for low or erratic pressure in a hydraulic system.

- 1) Very low relief valve setting
- 2) Leakage of pump delivery within the system
- 3) Pump slipping its entire volume

48. If a pneumatic cylinder has erratic motion, name the causes.

- 1) Valve Sticking or binding
- 2) Cylinder sticking or binding

49. What is tree-branching chart?

Tree-branching chart is a chart used to simplify the troubleshooting process. This chart asks a question which has only two possible answers – Yes or No. the answer determines the next step to be taken in fault analysis. This chart helps to develop a logical and rapid approach to fault diagnosis.

50. What are the basic elements of PLC?

- 1) Central processing unit with an associated memory
- 2) Input modules
- 3) Output modules

UNIT - IV

1. How does a hydro-pneumatic system differ from hydraulic system?
2. Explain the purpose, construction, and operation of filter, regulator & lubricator unit in pneumatic system.
3. Draw a pneumatic circuit for table movement and explain its principle.
4. What is an air-oil intensifier? Explain its application with example.
5. Briefly describe various pneumatic valves.
6. Explain vane type air motors with sketches.
7. What is cascade system? Design a pneumatic circuit using cascade method for the Sequence of $A^+ B^+ A^- B^-$
8. State some important parameters which may require constant attention in a pneumatic system.
9. If the pressure in the pneumatic system is too low, what are the possible causes and give remedies for them?
10. Describe the purpose, construction, and operation of compressors.
11. Discuss the construction and operation of pneumatic cylinders and motors.
12. Explain the working of (i) quick exhaust valve and (ii) time delay valve with neat sketch.

13. Design a system in which cylinder A is used to clamp the workpiece; cylinder B is used for punching and cylinder C moves the workpiece from the station by using cascade method.
Cylinder extension position-(clamping, punching and remove the workpiece)
Cylinder retraction position-(unclamping, after punching and after removal of workpiece)

UNIT - V

1. Explain about servo systems and proportional valves.
2. Explain the purpose, construction, and operation of mechanical-hydraulic and electro- hydraulic servo valves.
3. What are the various approaches for entering the program in the PLC?
4. Design a fluidic box sorting system for two different sized boxes moving on a conveyor by making use of the preference flip flop, DCV and Push buttons.
5. Design a fluidic sequencing control of two pneumatic cylinders using flip-flop, OR Gate, Push buttons, Directional control valves etc for the following sequence;

Cylinder 1 extends

Cylinder 2 extends

Both cylinders retract together.
6. Briefly explain the various electrical devices used in the control of Fluid Power systems.
7. Design and explain Electro pneumatic circuit for automobile reciprocation of a Double acting Cylinder using pressure switches.
8. What is PLC? Explain the elements of PLC with block diagram.
9. Write down the advantage of PLC over electro mechanical relays system.
10. Explain with neat diagrams closed loop (servo) electro hydraulic control system and Open loop hydraulic system.