UNIT V – DESIGN OF PNEUMATIC CIRCUITS

PART-A **(10 x 2 = 20)**

1. **How servo systems are essential for fluid power circuits.**

   The Servo valves are nothing but DC valves having ***infinitely variable positioning capability***. The servo valves are used control not only the direction of fluid flow, but also the amount of flow.

2. **What is the use of PLC in fluid power control?**

   (i) For ***logical functions*** like AND, OR and NOT etc.(ii) For the ***control of hydraulic cylinders*** (iii) For performing the ***Boolean logical functions*** and (iv) The ***sensing and feed back*** can be done at a faster rate.

3. **List the parts present in a PLC.**

   (i) ***Central Processing Unit*** (CPU)(ii) ***Programmer/monitor*** (PM) and (iii) ***Input/output module*** (I/O).

4. **Define the term troubleshooting.**

   The term troubleshooting refers to an organized and ***systematic study of the problemand a logical approach*** to the difficulty faced in a system.

5. **List out four things that can cause a noisy pump.**

   (i) ***Misalignment of pump*** and prime mover (ii) ***Strainer capacity insufficient*** (iii) ***Small size*** of suction pipe (iv) ***Pump bolts very loose*** and (v) Air remains in pump casing etc.

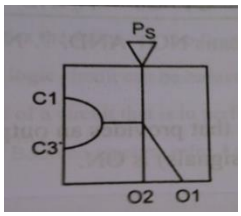
6. **State the advantages of fluidic elements.**

   (i) They offer exceptional ***thermal and physical stability*** and ruggedness, when compared to electronic control systems (ii) They are completely ***insensitive to radiation***, even of extremely high levels (iii) They are ***not affected by severe vibration and shock*** and(iv) They are not susceptible to wear and tear.

7. **What do you understand by the term power pack?**

   The ***hydraulic power pack contains all the basic devices*** like filler, regulator, pump, motor, and a tank that forms the basis for any hydraulic system major components

8. **Give the standard symbol for a fluidic AND gate.**



9. **List out the important causes for problems in pneumatic systems.**

   (i) ***Outlet pressure of the air*** that is being delivered by the compressor when it's not sufficient (ii) ***DCV's not working properly***, then there is a cause of failure (iii) The ***actuators not working properly*** due to mechanical problems and (iv) The ***pipelines and hoses*** are not installed properly.

10. When are the PLC systems preferred for fluid power control?

(i) ***Lesser space*** but lot of tasks needs to be performed (ii) ***Lesser electrical power levels***(iii) ***Industrial controlling*** of all the logical functions and (iv) ***For timing, counting, and arithmetic*** and ***Boolean functions***.

PART-B **(4 x 16 = 64)**

11. a) (i) Describe the hydro-mechanical servo system with a neat sketch

(Keywords: Automotive power steering application of hydro- mechanical servo system along with diagram, Construction and explanation along with the working principle.)

(ii) How the failure and troubleshooting is carried out in fluid power circuits?

(Keywords: Explanation of common faults in hydraulic systems, common causes of hydraulic system break downs and flow charts.)

b) Brief on the fault finding and maintenance of hydraulic and pneumatic systems

(Keywords: <u>For hydraulics</u> with respect to pump, relief valves, DCV's, sequencing valves, unloading valves, FCV's, hydraulic motors etc. <u>For pneumatics</u> with respect to compressor, filters, DCV's, regulators, lubricators, air motors etc.)

12. a) List out any four problems associated with pumps and valves and the corresponding possible causes and suitable remedy for each operation

(Keywords: Four pump problems like pump delivering insufficient oil or no oil, pump unstable or zero pressure, pump making noise and pump oil over heated . Probable causes and remedial actions to be done.)

b) Explain the trouble shooting of pneumatic systems in a clear manner

(Keywords: For pneumatics explanation of basic components with respect to compressor, filters, DCV's, regulators, lubricators, air motors etc. Probable causes and remedial actions to be done.)

13. a) (i) Explain the elements of PLC using block diagram

(Keywords: PLC block diagram, explanation of parts etc.)

(ii) Briefly explain the maintenance requirements for hydraulic power packs

(Keywords: Explanation of various elements present in a hydraulic power pack. Probable causes and remedial actions to be done.)

b) Discuss the selection criteria for pneumatic components in detail

(Keywords: Maximum pressure requirements, size, rating, speed, safety, areas of application etc)

14. a) Explain electro-hydraulic servo valve with a neat sketch.

(Keywords: Diagram of a hydro-mechanical servo valve, construction and working along with an application based on diagram.)

b) (i) How contamination of oil in hydraulic systems is taking place? How is it analyzed and reduced?

(Keywords: Powdered metal scraps, un-filterable tiny scraps, atmospheric conditions, various metals usage for valves, contamination of oil by dust particles etc.)

(ii) What is low cost automation? Discuss with a case study.

(Keywords: Any one of the circuits in a plant when controlled with a PC installed with software, and controlled by PLC.)

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QUESTION BANK - II

PART-A

1. What is ladder diagram?
2. List the devices commonly used for control of fluid power systems.
3. Define Fluidics.
4. List out any two servo systems.
5. What is the use of ladder diagrams?
6. Explain why interfacing is necessary in a microprocessor control of fluid power?
7. What is the main advantage of hydro pneumatics?
8. What do you mean by logic control?
9. Name the different pneumatic position sensors.
10. Name the common methods used for designing logic circuits?

PART-B

11. a) Explain the two stage electro hydraulic servo system with a neat sketch.
    b) Explain with a neat sketch construction and operation of proportional pressure relief and pressure reducing valves.
12. a) Explain the jet pipe electro hydraulic servo valve with a neat sketch.
    b)(i) How is AND function achieved in a fluidic circuit?
    (ii) Discuss the circuit for memory function in fluidics.
    (iii)Discuss any eight common problems and their remedies in pneumatic circuits.

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