

VALLIAMMAI ENGINEERING COLLEGE
DEPARTMENT OF MECHANICAL ENGINEERING
ME-2305 APPLIED HYDRAULICS AND PNEUMATICS
FIFTH SEMESTER

UNIT-1
HYDRAULICS - FLUID POWER SYSTEMS AND FUNDAMENTALS

PART-A

1. Define fluid power.
2. Differentiate hydraulic and pneumatics
3. Define Pascal law.
4. What are the advantage and disadvantage of fluid power?
5. What is the function of hydraulic fluid?
6. What are the properties of hydraulic fluid?
7. Name the basic component of hydraulic systems.
8. Define pour point, flash point.
9. Define demulsibility.
10. Define neutralization number of hydraulic fluid
11. List the application of fluid power?
12. Define viscosity and viscosity index.
13. What is the effect in the hydraulic fluid when oil viscosity is too high?
14. What is the effect in the hydraulic fluid when oil viscosity is too low?
15. What is meant by the term bulk modulus?
16. List the three basic types of Fluid Power control systems.
17. What is the main difference between a open-loop and closed-loop fluid power system?
18. What is the purposed of Darcy – Weisbach equation?
19. List the three basic types of Fluid Power control systems.
20. Why are hydraulic systems preferred for heavy work than the pneumatic systems?

PART-B

1. Explain in details about the application of Pascal law with neat sketch.
2. Explain in details about the properties of hydraulic fluids.
3. Explain with neat sketch of the basic hydraulic system and its components.
4. What are the types of fluid power system and explain in detail?
5. Explain in details about the various losses in hydraulic fluid power systems?
6. Explain with neat sketch about graphical symbols used in hydraulic system and its function.
7. Write Short notes on the following
 - i) Laminar flow and turbulent flow
 - ii) Energy losses in valves and fittings

iii) Darcy's Equation.

8. Explain with neat sketch about Fluid Power control systems.

9. Write short notes about types of fluids used in the fluid power systems.

10. Fluid is flowing through a tapering pipe having diameters 50mm and 25mm at sections 1 and 2 respectively. The discharge through the pipe is 7.5 LPS (litres per second). The section 1 is 3m above datum and section 2 is 1.25m above datum. If the pressure at section 1 is 200 kpa, find the pressure at section 2. The specific gravity of the fluid is 0.9.

UNIT-2

HYDRAULICS SYSTEMS AND COMPONENTS

PART-A

1. Define pump.
2. What is meant by positive and non-positive displacement pump?
3. What is meant by fixed displacement and variable displacement pump?
4. What is the classification pump?
5. What is meant by a balanced vane pump?
6. Define volumetric efficiency of a pump.
7. Define mechanical efficiency of a pump.
8. Define overall efficiency of a pump.
9. Draw the graphical symbols of the following pumps
 - i) Fixed displacement
 - ii) Variable displacement
 - iii) Pressure compensated
 - iv) Bidirectional
10. Define hydraulic actuator.
11. What are the types of hydraulic actuator?
12. Define motor.
13. What is semi-rotary actuator?
14. List the application of semi-rotary actuator?
15. What are the types of piston pump?
16. What are the types of gear pump?
17. What are the types of hydraulic cylinder?
18. What is cylinder cushioning?
19. What is telescoping cylinder
20. Name the types of cylinder mountings?

PART-B

1. Explain the working principle of external Gear pump and Internal Gear pump with neat sketch.
2. Explain the working principle of axial piston pumps with neat sketch?
3. What are the types of piston pump? Explain the working principle of radial piston pumps with neat sketch?
4. Explain the working principle of following pumps with neat sketch
 - i) Lobe pump
 - ii) Screw pump
 - iii) Gerotor pump
5. Explain the working principle of unbalanced vane pumps and balanced vane pump with neat sketch?
6. Explain the working principle of Gear type motor with neat sketch.
7. Explain the working principle of piston type motor with neat sketch.
8. Explain the working principle semi-rotary actuator with neat sketch.
9. Explain the working principle following types of cylinders
 - i) Single acting cylinder
 - ii) Double acting cylinder
 - iii) Cylinder Cushioning
10. Explain the working principle of different types of cylinders used in hydraulic system.

UNIT-3

DESIGN OF HYDRAULIC CIRCUITS

PART-A

1. What is the function of relief valve in a hydraulic system ?
2. What is the function of an unloading valve ?
3. What is the difference between pilot operated and direct operated pressure relief valve?
4. What is the purpose of a direction control valve ?
5. What is the function of a sequence valve?
6. What is the function of a shuttle valve?
7. How do you classify direction control valves?
8. Draw the ANSI symbol for i) Pilot operated check valve (ii) Shuttle valve
9. List any four types of Pressure Control Valves.
10. What is the purpose of a flow control valve ?
11. What is the purpose of regenerative circuit?
12. Write the functions of a solenoid valve.
13. What is meter-in circuit and where is it used?
14. What is meter – out circuit and where is it used ?

15. What is the function of bleed off circuits?
16. What is the function of a sequence valve?
17. What is a hydraulic accumulator and types?
18. What are the functions of accumulators?
19. What is meant by sizing of accumulator?
20. What is the function of intensifier in hydraulic circuit?

PART-B

- 1.(i) Explain the working principle of following
 - a) 3/2 way valve
 - b) 4/2 way valve
 - c) 4/3 way valve

(ii) Sketch and explain commonly used 3-position 4-way direction control valves.
2. Draw any two circuits using accumulator for different applications.
3. (i) Explain the construction and working of pilot operated sequence valve

(ii) Make a circuit sketch showing the use of an accumulator, as a hydraulic shock absorber.
- 4.(i) Draw and explain the Counterbalance circuit used in the hydraulic circuit.

(ii) Write and Explain the working principle of pressure intensifier, with neat diagram.
5. (i) Design and explain the working of Pressure control valve.

6. what are the types of accumulator? Briefly describe the construction of any two types of accumulators.
7. Explain the construction and working of following control components
 - 1) check valve
 - 2) Shuttle valve
 - 3) Sequence valve
 - 4) Flow control valve
8. Discuss the construction and working of a solenoid actuated valve with a diagram.
9. With suitable sketches explain following industrial hydraulic circuits
 - (i) Pressure regulating circuit
 - (ii) Speed control circuit.
10. Explain the construction and working of following.
 - i) Pressure reducing valve
 - ii) Pressure relief valve

UNIT-4

PNEUMATIC SYSTEMS & COMPONENTS

PART-A

1. Give the standard graphical symbol for FRL unit.
2. What is the function of an air filter?
3. What is the purpose of a pressure regulator?
4. What is the purpose of a quick Exhaust Valve?
5. What is the function at reservoir in a pneumatic system?
6. How are logic circuits classified?
7. What is a cascade system?
8. What is the purpose of fail-safe circuit?
9. What is bitable flip-flop?
10. How is the speed of a cylinder controlled in pneumatic system?
11. How are logic circuits classified?
12. What are asynchronous sequential circuits?
13. Sketch the graphical symbol of pneumatic regulator.
14. Why should a lubricator be used in a pneumatic system?
15. What is the need of lubricator unit in the pneumatic system?
16. Name the various types of filters used in the pneumatic system.
17. What is air-oil intensifier?
18. What is the purpose of a quick Exhaust Valve?
19. Classify the pneumatic cylinders based on operating principle.
20. What is meant by an air-over-oil system?

PART-B

1. Explain the construction and working of following.
 - i) meter-in circuit
 - ii) meter-out circuit
2. Design a pneumatic circuit for the following sequence using cascade method $A^+B^+B^-A^-C^+C^-$ where the + cylinder extraction and - cylinder retraction.
3. Design a pneumatic circuit for the following sequence using cascade method $A^+B^+B^-A^-$ where the + cylinder extraction and - cylinder retraction.
4. Explain the construction and working of following control components.
 - a)Filter
 - b)Regulator
 - c)Lubricator
5. (i)Explain the working of of a regenerative circuit.

- (ii) Design and explain the working of a sequencing circuit.
 - (iii) Describe an hydraulic circuit for synchronizing two cylinder with flow control valves.
6. What is compressor? Explain the working principle of piston type compressor with neat sketch
 7. Explain with neat block diagram an air pilot control circuit for a double acting cylinder.
 8. Draw the neat sketch of the pneumatic filter and explain its construction and working.
 9. Explain with neat block diagram an air pilot control circuit for a double acting cylinder.
 10. Develop a continuous single cylinder reciprocation circuit for pneumatic system using limit switches and relays.

UNIT-5

DESIGN OF PNEUMATIC CIRCUITS

PART-A

1. Define is servo valve.
2. What is a power pack?
3. What is the purpose of feedback in a servo system?
4. Name one application of mechanical-hydraulic servo system ?
5. What are Proportional Control Valves ?
6. Compare Electro-hydraulic Servo Valve and Proportional hydraulic Valves.
7. What is the difference between a pressure Switch and a temperature Switch?
8. What are the advantages of fluidic control devices?
9. What is ladder diagram?
10. What is Programmable Logic Control (PLC)?
11. List the components present in PLC.
12. State the 'Coanda Effect'
13. What is an Electrical relay?
14. How does a servo valve differ from proportional valve?
15. What are some common application of Servo Valves?
16. What is an electro-mechanical relay?
17. How servo systems are essential for fluid power circuits?
18. How does a servo valve differ from proportional valve?
19. Define FLUIDICS?
20. List four types of faults and causes of hydraulic system break down.

PART-B

1. Draw and Explain the working of proportional pressure reducing valve.
2. Explain the construction and working principle of hydro-mechanical servo valves with neat diagram.
3. Describe the working of electro hydraulic servo valves with a block diagram. state at least two application.
4. Explain the ladder logic diagram with an example.
5. What is Servo Valve? What is the function of feedback of Servo System?

6. Explain in detail about how the failure and trouble shooting is carried out in fluid power circuits.
7. Explain in detail about Various selection criteria for pneumatic components
8. What is Coanda effect? Explain with neat sketch.
9. Design and draw an electro hydraulic pneumatic circ it for the sequence. A+ B+B- A-. Also write a ladder diagram.
10. List out any five types of faults that can be found in compressors. Also write the remedial actions for the faults.
