ME8694 HYDRAULICS AND PNEUMATICS

IMPORTANT QUESTIONS AND QUESTION BANK

UNIT-I FLUID POWER PRINICIPLES AND HYDRAULIC PUMPS

2-Marks

1. Describe fluid power?
2. Define Pascal law?
3. Describe the primary functions of a fluid in the fluid power systems?
4. Name the basic component which is employed in the hydraulic systems?
5. Define demulsibility?
6. Define neutralization number of hydraulic fluids?
7. Why water is not used as hydraulic fluid in fluid power systems?
8. Describe the term volumetric efficiency and mechanical efficiency?
9. Write the Darcy's equation and explain the uses of Darcy's equation?
10. What is positive displacement pump? Why are they called so?

Part-B

1. State Pascal's law and Explain in details about the application of Pascal's law with neat sketch?
2. Discuss the following, Draw and name the graphic symbols used for pump and motor. Draw and name the graphic symbols used for cylinder and flow control valves?
3. Explain with neat sketch about working principle of basic hydraulic system and pneumatic system?
4. Discuss the following Various types of hydraulic fluids used in the hydraulic systems And Properties of hydraulic fluids?
5. Explain the following Fluid power system based on control system and explain Fluid power system based on type of control?
6. Explain in details about the various losses in hydraulic fluid power systems?
7. Explain the pumping theory with suitable sketch and explain he working of Lobe pump with suitable sketch?
8. Explain the working principle of following pumps with neat sketch (i) Lobe pump (7) (ii) Screw pump (6)?

9. (I) Explain the external gear pump with suitable sketch.(6)

   (ii) Explain the working of internal gear pump with suitable sketch. (7)

10. Explain the construction and working principle of in-line axial piston pump with suitable sketch?
11. Explain the construction and working principle of bend axis axial piston pump with suitable sketch?
12. Describe the working principle of radial piston pump with suitable sketch?
13. Explain the performance characteristics of pump with suitable sketch and specific term associated with performance?
14. Design the hydraulic circuit and explain with neat sketch for the application of hand operated hydraulic jack?
15. Write short notes about the various application of hydraulic systems with suitable example?

UNIT II HYDRAULIC ACTUATORS AND CONTROL COMPONENTS

2-Marks

1. Describe actuator?
2. Classify the various types of actuator?
3. Discuss about telescoping cylinder?
4. Name the types of cylinder mountings?
5. Describe the term cylinder cushioning?
6. Draw the ANSI symbol for bidirectional fixed displacement unidirectional motor and variable displacement bidirectional motor?
7. What is the function of sequence valve and pressure reducing valve?
8. Describe the three important parameters should controlled the hydraulic system?
9. Discuss the function of pressure control valve?
10. What are flow control valves? Why are they referred as speed-control valves?

Part-B

1. Explain the working principle following types of cylinders i) Single acting cylinder (ii) Cylinder Cushioning?

2. Explain the construction and working of following with neat sketch (i) Gear motor ((ii) Double acting cylinder

3. With neat sketch explain the construction of Telescopic cylinder and state its application with example?

4. Explain with the neat sketches about the construction and working principle of vane motor and state its applications?
5. Explain the following with neat sketch (i) Poppet valve. (ii) Pilot operated check valve?
6. Explain with neat sketch about different types of flow control valve used in the hydraulics systems?
7. Explain the neat sketch about the following (i) Meter-in & (ii) Meter-out?

8. Explain with neat sketch about spring loaded pressure relief valve and pressure reduce valve?
9. Explain with neat sketch about compound pressure relief valve?

10. Explain with neat sketch about the following (i) Unloading valve (ii) Sequence valve?
11. Explain the construction and working principle of rotary spool valve used in the hydraulic systems?
12. Design the hydraulic drilling circuit using sequence valve and explain with neat sketch
13. Explain and design the hydraulic circuit by using pressure reducing valve for the weld and clamp unit to weld the Engineering materials?

14. Explain with suitable sketch and mention the various possible location of filters in the hydraulic circuit systems?

15. Discuss the following (i) Proportional pressure relief valve. (ii) Proportional pressure reducing valve?

UNIT-3 HYDRAULICS CIRCUIT AND SYSTEMS

2-Marks

1. Draw the different types of accumulator symbols?
2. Discuss the functions of accumulators?
3. What is meant by sizing of accumulator?
4. What is the function of pressure intensifier?
5. Define the term “capacity of accumulator”?
6. What type of gases used in a gas loaded accumulator? Why oxygen not used for this purpose?
7. What condition in a hydraulic system would require an intensifier?
8. Define the term intensifier ratio?
9. What is the purpose of using fail safe circuit in any hydraulic system?
10. What are electrohydraulic servo valves? How do they differ from mechanical servo valves?

Part-B

1. With a neat sketch, explain the construction and working of a piston type accumulator and diaphragm type accumulator?
2. Design and explain the working of a sequencing circuit.
3. Explain the construction and working of pilot operated sequence valve?
4. Draw and explain the Counterbalance circuit used in the hydraulic circuit?
5. Design and explain the working of a regenerative circuit?
6. Explain the working principle of pressure intensifier, with neat diagram?
7. Draw and explain the Air-over-oil circuit used in the hydraulic circuit?
8. Design the intensifier circuit for the application of punching press in the hydraulic circuit?
9. Design and explain the working of Electro hydraulic circuit?
10. A double acting cylinder is hooked up in a regenerative circuit for drilling application. The relief valve is set at 75 bar. The piston diameter is 140mm and rod diameter is 100 mm. If the pump flow is 80 1/min. find the cylinder speed and load carrying capacity for various position of direction control valve?
11. Design the accumulator circuit for the application of leakage compensator and auxiliary power source in the hydraulic circuit?
12. Create a failsafe control circuit using emergency cut off value and two hand safety control circuit?
13. Design the accumulator circuit for the application of hydraulic shock absorber and Emergency power source in the hydraulic circuit?
14. Develop a circuit having 4/3 DCV regenerative neutral used to control double

acting cylinder?

15. Discuss the construction and working of a mechanical hydro servo system with a neat diagram?

UNIT – 4 PNEUMATIC AND ELECTRO PNEUMATIC SYSTEM

2 Marks

1. Give the standard graphical symbol for FRL unit?
2. Discuss the function of an air filter?
3. Point out the purpose of a Pressure regulator?
4. Point out the purpose of a quick Exhaust Valve?
5. Sketch the graphical symbol of pneumatic regulator?
6. Discuss the function at reservoir in a pneumatic system?
7. How are logic circuits classified?
8. List the components present in PLC?
9. Mention the few applications of air cylinder?
10. Define Programmable Logic Control (PLC)?

Part-B

1. Define compressor. Explain the working principle of piston type compressor and screw type compressor with neat sketch?
2. With a neat sketch of the pneumatic filter and explain its construction and working of cartridge filter?
3. With a neat sketch of the pneumatic Regulator and explain its construction and working?
4. Explain the construction and working principle of Muffler with neat sketch?
5. Sketch the graphical symbol and Explain the construction and working principle of FRL Unit with neat sketch?
6. Explain the construction and operation of quick exhaust valve with neat sketch?
7. Design a pneumatic circuit for the following sequence using cascade method A+B+B-A- where the + cylinder extraction and – cylinder retraction?
8. Explain the construction and operation of rotary actuators with neat sketch?
9. Design a pneumatic circuit using cascade method for the sequence A+A-B+B- and its explain it working principle?
10. Give the empirical rules for sizing the compressor?

11. Define coanda effect. Discuss how this effect useful to develop a mono stable and bi-stable devices?
12. Design a pneumatic cascade circuit for the following sequence of operation: $A^+ B^+B^-C^+C^-A$ and Also develop the travel-step diagram for the above sequence of operation?
13. Explain the various approaches for entering the program into the PLC.?
14. Explain the ladder logic diagram with a suitable example?
15. Explain the construction and working of following pneumatic control components (i) check valve
    (ii) shuttle valve
    (iii) sequence valve and
    (iv) flow control valve

UNIT 5 TROUBLE SHOOTING AND APPLICATIONS

2-Marks

1. What are the basic requirements for trouble free life of fluid power systems?
2. List any two common faults in hydraulic system?
3. Name any two faults that can be found in pneumatic systems?
4. How a hydraulic system breaks down?
5. Distinguish between hydraulic and pneumatic systems?
6. What is the purpose of tree branching chart?
7. List any four pump faults?
8. What does the term troubleshooting refer?
9. If a pump is delivering insufficient or no oil, what are all the possible causes and also give remedies for them?
10. Mention any two roles of pneumatic systems in low cost automation?

Part-B

1. Design and draw a circuit using the hydraulic components for the Shaping operation?
2. Design and draw a circuit using the hydraulic components for the Drilling operation?
3. Design a circuit using the hydraulic components for the Press operation?
4. Tabulate the various faults, probable causes and also the remedial actions for the following hydraulic system components (i) pump (ii) DC valve (iii) hydraulic motor (iv) hydraulic cylinders?
5. Enlist the various faults, probable causes and also the remedial actions for the following pneumatic system components (i) compressor (ii) FRL unit (iii) air cylinders and (iv) Pipelines and hoses?
6. What is the tree branching in pneumatic fault finding system?

7. What is the tree branching in hydraulic faul finding system?
8. List down the features of lowcost automation?
9. Design and develop a pneumatic system to pick and place objects?
10. Design and develop the tool handling system in a CNC machine?
11. Narrate a case study of lowcost automation?
12. Draw and explain a pneumatic circuit to actuate a shaping machine ram. Incorporate the following features in the circuit (i) Rapid tool approach (ii) Slow cutting (iii) Rapid tool retraction/ return?
13. Explain in various about detail selection various criteria for pneumatic compounds?
14. Explain the details about how the failure a trouble shooting is carried out in hydraulic system?