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18ME55

Fifth Semester B.E. Degree Examination, July/August 2021
Fluid Power Engineering

Time: 3 hrs.   Max. Marks: 100

Note: Answer any FIVE full questions.

1 a. Define fluid power technology. Mention the advantages and applications of fluid power system. **(06 Marks)**
   b. What is Pascal's law? Explain the concept of force multiplication. **(06 Marks)**
   c. Write notes on:
       (i)   Sealing materials
       (ii)   Pressure drop in hoses/pipes **(08 Marks)**

2 a. Explain the desirable properties of hydraulic fluids in industrial hydraulic systems. **(08 Marks)**
   b. Explain the various filter locations used in filtering in hydraulic systems. **(06 Marks)**
   c. Write a note on hoses and quick acting couplings. **(06 Marks)**

3 a. With a neat sketch, explain the construction and working of variable displacement vane pump. Also mention the difference between positive and non positive displacement pumps. **(10 Marks)**
   b. Write a note on performance characteristics of gear pump. **(05 Marks)**
   c. Explain briefly the gas loaded type of accumulator with a neat sketch. **(05 Marks)**

4 a. Explain the working of cushioning and telescopic cylinders with a neat sketch with suitable applications. **(10 Marks)**
   b. A hydraulic motor has a volumetric displacement of $123 \times 10^{-6} \text{ m}^3$. If it receives 0.0009 m^3/s of oil at 50 bars, find:
       (i)   Speed of the motor
       (ii)   Theoretical torque
       (iii) Theoretical power of the motor **(06 Marks)**
   c. Mention the difference between:
       (i)   Hydraulic pump and hydraulic motor
       (ii)   Linean Actuator and Rotary Actuator **(04 Marks)**

5 a. Give the classification of control valves. Also explain the different centre positions of 3 position 4 way direction control valves with symbolic representations. **(09 Marks)**
   b. Discuss the working of pressure compensated flow control valve with a neat sketch. **(06 Marks)**
   c. Give the symbolic representation of :
       (i)   Pressure relief valve
       (ii)   Pressure reducing valve **(05 Marks)**

6 a. Explain the following with a neat hydraulic circuits:
       (i)   Force Multiplication Circuit
       (ii)   Sequencing Circuit **(16 Marks)**
   b. Explain the speed control of hydraulic cylinder involved with meter-in circuit. **(04 Marks)**

7 a. Discuss the structure of pneumatic control system with the aid of block diagram. Also mention the limitations of pneumatic system. **(08 Marks)**

b. List the characteristics of compressed air in pneumatic systems. **(06 Marks)**

c. Explain in brief FRL Unit with a neat diagram. **(06 Marks)**

8 a. Explain the working principles of the following pneumatic cylinders with neat sketches:
   (i) Impact cylinder
   (ii) Rodless cylinders **(08 Marks)**

b. Explain the following with neat sketches:
   (i) Quick Exhaust Valve
   (ii) Time Delay Valve
   (iii) Shuttle valve **(12 Marks)**

9 a. Explain the direct and indirect actuation of cylinders in pneumatic systems with simple circuits. **(06 Marks)**

b. Explain the following pneumatic circuits:
   (i) Supply Air Throttling
   (ii) Exhaust Air Throttling **(06 Marks)**

c. Explain the OR Gate logic with truth table and symbol. **(08 Marks)**

10 a. Discuss the motion control diagram for a 2-cylinder circuit. **(12 Marks)**

b. Explain the use of relays in electro-pneumatic control. **(08 Marks)**

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