CBCS SCHEME

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18ME55

Fifth Semester B.E. Degree Examination, Feb./Mar. 2022
Fluid Power Engineering

Time: 3 hrs.

Max. Marks: 100

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

1 a. Define fluid power system. Sketch and explain the structure of a hydraulic control system. **(08 Marks)**
   b. State Pascal's law and explain its applications. **(06 Marks)**
   c. A force of 500 N is applied on a plunger of 5 cm diameter of a hydraulic press that moves the piston through a distance of 20 cm. What is the maximum weight of the load that can be placed on the ram and what will be the displacement of the ram, if the diameter of the ram is 40 cm. **(06 Marks)**

OR

2 a. What are the desirable properties of hydraulic fluids? Explain them. **(08 Marks)**
   b. Define a seal. Explain in brief, how hydraulic seals are classified. **(08 Marks)**
   c. What are the methods to control contamination in a system? **(04 Marks)**

Module-2

3 a. Explain the working principle of an external gear pump. **(05 Marks)**
   b. What are the factors considered for selecting a hydraulic pump and explain the pumping theory of positive displacement pumps? **(09 Marks)**
   c. A vane pump has its rotor and cam ring diameters of 60 mm and 80 mm respectively. If the volumetric displacement is 90 cm^3/rev and the width of the vane is 3 cm, what is eccentricity? What is the maximum displacement possible? **(06 Marks)**

OR

4 a. Explain the following with neat sketches:
      (i) Single-acting cylinder
      (ii) Telescopic cylinder **(08 Marks)**
   b. What is a hydraulic motor? What are the four broad basis of classification of hydraulic motors? **(05 Marks)**
   c. A hydraulic motor has a volumetric displacement of 123 cm^3 operating at a pressure of 60 bar and speed 180 rpm. If the actual flow rate consumed by the motor is 0.004 m^3/sec and actual torque delivered by motor is 100 Nm, find:
      (i) Volumetric efficiency (ii) Mechanical efficiency   (iii) Overall efficiency. **(07 Marks)**

Module-3

5 a. Explain with a neat sketch, the principle of working of a pilot operated pressure relief valve. Draw the graphical symbol of the valve. **(07 Marks)**
   b. With a neat sketch, explain the working of a check valve. **(06 Marks)**
   c. Define control valves. Explain the classification of control valves. **(07 Marks)**

OR

6   a.   Explain the following with neat sketches:
          (i)   Sliding spool flow control valve
          (ii) Needle flow control valve   (04 Marks)
     b.   Explain the concept of meter-in and meter-out circuits. List the advantages and limitations of each of the circuit.   (10 Marks)
     c.   What is a regenerative circuit? Sketch schematically regenerative circuit to increase the regenerative speed of the cylinder.   (06 Marks)

Module-4

7   a.   What are the advantages, disadvantages and applications of pneumatic system?   (07 Marks)
     b.   Explain the characteristics of compressed air.   (04 Marks)
     c.   Explain the construction and working of single and double acting cylinder.   (09 Marks)

OR

8   a.   Briefly explain cylinder cushioning.   (08 Marks)
     b.   Explain with a suitable circuit diagram, Quick Exhaust Valve.   (06 Marks)
     c.   Explain with a neat sketch, the construction of poppet valves.   (06 Marks)

Module-5

9   a.   Explain the following functions generated in pneumatic systems:
          (i)   OR gate
          (ii)   AND gate
          (iii) NOT gate   (12 Marks)
     b.   Explain direct and indirect actuation of pneumatic cylinders.   (08 Marks)

OR

10   a.   Write short notes on the following:
          (i)   Solenoid
          (ii)   Electromagnetic Relay   (08 Marks)
     b.   What are the advantages of cascade design?   (03 Marks)
     c.   Explain with a neat sketch, coordinated sequence motion of two cylinders.   (09 Marks)

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