



- Notes :
1. All questions carry marks as indicated.
  2. Solve Question 1 OR Questions No. 2.
  3. Solve Question 3 OR Questions No. 4.
  4. Solve Question 5 OR Questions No. 6.
  5. Solve Question 7 OR Questions No. 8.
  6. Solve Question 9 OR Questions No. 10.
  7. Solve Question 11 OR Questions No. 12.
  8. Due credit will be given to neatness and adequate dimensions.
  9. Assume suitable data whenever necessary.
  10. Diagrams and equations should be given whenever necessary.
  11. Illustrate your answers whenever necessary with the help of neat sketches.

1. a) Discuss types of hydraulic fluids. **6**
- b) What are the effects of temperature and pressure on hydraulic fluids? **4**
- c) What are requirements of a good hydraulic fluid? **4**

**OR**

2. a) Discuss components of hydraulic system. **6**
- b) What are advantages of hydraulic system over mechanical and electrical systems. **4**
- c) Discuss at least two industrial applications of hydraulic systems. **4**
3. a) Draw the symbols for following:- **8**
  - i) Check valve
  - ii) Filter
  - iii) Weight loaded accumulator
  - iv) Compressor
  - v) Pressure compensated flow control valve
  - vi) Double acting cylinder with single piston rod.
  - vii) Gas charged accumulator.
  - viii) Pump.
- b) What are factor considered while selecting a pump in a hydraulic system? **5**

**OR**

4. a) Discuss internal gear pump with neat sketch. **9**
- b) How much power would a pump produce when operating at 140 bar and delivering  $0.001\text{m}^3/\text{s}$  of oil? What power rated electric motor would be selected to drive this pump if its overall efficiency is 85%? **4**
5. a) Assuming friction to be negligible, determine the weight that must be used to generate 10MPa from an accumulator with a cross section diameter of 0.3m. What must be stroke length to have capacity of  $0.2\text{m}^3$ ? **5**
- b) The following data is available for an axial piston pump:  
 $N=1000\text{ rpm}$ , no. of cylinder = 9, diameter of piston = 15mm, ring diameter of block=152mm and angle of inclination is  $30^\circ$ . Calculate input and output power if the overall efficiency is 85% and mechanical efficiency is 90%. **8**

**OR**

6. a) A vane pump was tested at rated pressure 100 bar and 1800 rpm. It delivered actual flow of 162 liters per minute.  
 Rotor diameter = 65mm, Cam ring diameter = 90mm, Vane width = 55mm, Eccentricity=8mm, Torque = 220Nm, Calculate. **8**
- i) Theoretical flow rate  
 ii) Volumetric efficiency  
 iii) Mechanical efficiency  
 iv) Power output
- b) A hydraulic motor has displacement of  $164\text{cm}^3$  and operates with a pressure of 70 bar and a speed of 2000 rpm. If the actual flow rate consumed by motor is  $0.006\text{m}^3/\text{s}$  & actual torque delivered by motor is 170Nm, find the power output, volumetric and overall efficiency. **5**
7. Draw the hydraulic circuits using suitable components with appropriate function (any two circuits of the following) **14**
- i) Circuit illustrating use of sequencing valve.  
 ii) Circuit illustrating use of accumulator.  
 iii) Meter in circuit.  
 iv) Circuit illustrating use of unloading valve.

**OR**

8. a) For the meter in system as shown the following data are given. **6**  
 Desired cylinder speed = 25 cm/s  
 Cylinder diameter = 5cm  
 Cylinder load = 12000N  
 PRV setting = 7000kPa  
 Determine the required capacity coefficient of the FCV.
- b) What do you mean by pressure override in context of PCV. Discuss showing curves. **4**
- c) Why in FCV the pressure compensation and temperature compensation is required? How it is provided? **4**

9. a) Discuss FRL unit in Pneumatic system. 7  
b) Discuss two stage reciprocating air compressor used in pneumatic system. 6

**OR**

10. a) Discuss hydraulic circuit for shaper machine. 9  
b) What is meant by Beta ratio designation  $B_\beta = 75$ ? Determine Beta ratio of a filter when, during test operation, 30000 particles greater than  $20\mu\text{m}$  enter the filter and 1050 of these particles pass through the filter. What is Beta efficiency in this case? 4
11. a) Draw and discuss single acting air cylinder. 7  
b) Discuss 2/2 dc valve and 3/2 dc valve used in pneumatic system. Draw neat sketch. 6

**OR**

12. a) What are merits and demerits of pneumatic system over hydraulic and electrical systems? 6  
b) Discuss Vane type air motor with neat sketch. 7

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