

GUJARAT TECHNOLOGICAL UNIVERSITY
BE - SEMESTER-VIII • EXAMINATION – WINTER • 2014

Subject Code: 180204**Date: 25-11-2014****Subject Name: Automotive Hydraulics and Pneumatics****Time: 02:30 pm - 05:00 pm****Total Marks: 70****Instructions:**

1. Attempt all questions.
2. Make suitable assumptions wherever necessary.
3. Figures to the right indicate full marks.

- Q.1** (a) Draw and explain in brief different elements of hydraulic system. **07**
 (b) a) List any five properties that a hydraulic oil should possess. **04**
 b) List the types of additive used in a hydraulic fluid. **03**
- Q.2** (a) Explain with a neat sketch the working of gear motor. **07**
 (b) Differentiate hydraulic and pneumatic power system. **07**
- OR**
- (b) Write short note on hydraulic braking system with neat sketch. **07**
- Q.3** (a) Draw a schematic of 3/2 DCV that is manually operated and briefly explain its function. **07**
 (b) Draw schematically a pilot operated relief valve and explain its function. **07**
- OR**
- Q.3** (a) Draw symbols for following hydraulic elements. **07**
 a) Single acting cylinder with spring return
 b) 5/2 Directional control valve
 c) Sequence valve
 d) Double acting cylinder
 e) Throttle valve
 f) Filter Strainer
 g) Push button
- (b) a) A cylinder container has a diameter of 0.5 m and a height of 1 m. If it is to be filled with a liquid having a specific weight of 2000 N/m³, how many kg of this liquid must be added? **04**
03
 b) An 8 Liter sample of oil is compressed in a cylinder until pressure increases from 0.7 to 2.7 MPa. If the bulk modulus equals 80 MPa, find the change in the volume of oil.
- Q.4** (a) Write short note on Hydraulic power steering with neat sketch. **07**
 (b) What is servo valve? How does it work? Describe mechanical-hydraulic servo valve. **07**
- OR**
- Q.4** (a) Explain with neat sketch Meter in hydraulic circuit with suitable example. **07**
 (b) Explain with the help of neat sketch the construction and working of quick exhaust valves. **07**
- Q.5** (a) A Pneumatic system is to be designed to operate a door of public transport vehicles. Assuming that the opening and closing of the doors are controlled by two button switches ON and OFF. When the button switch ON is pressed, the door will open. When the button switch OFF is pushed, the doors will close. **07**
 (b) How can you classify the pneumatic actuators? How do hydraulic actuators differ from pneumatic actuators? **07**

OR

- Q.5** (a) Draw a Pneumatic circuit for a small single acting cylinder is to extend and clamp a work piece when a push button is pressed. As long as the push button is activated, the cylinder should remain in the clamped position. If the push button is released, the clamp is to retract. Use additional start button. **07**
- (b) State **True** or **False**: **07**
- a) Water is a good functional hydraulic fluid.
 - b) Gauge pressures are measured relative to atmosphere.
 - c) The viscosity of hydraulic oils increases with increases in temperature.
 - d) Synthetic fluid can have a relative density greater than 1.
 - e) Hydraulic power is equal to the product of pressure and volume flow rate.
 - f) Single acting cylinders can exert a force in both the extending and retracting direction.
 - g) A pilot operated check valve always permits flow in one direction only.
 - h) Sequence valves are similar to pressure relief valves.
 - i) In a meter-in circuit, the extending speed of the cylinder is controlled whereas the retracing speed is not.
 - j) Speed control by controlling the rate of flow out of the cylinder is called meter-in control.
 - k) Shuttle valve is the pneumatic OR valve.
 - l) Quick exhaust valves are designed to decrease the position speed in the cylinder.
 - m) Pneumatic systems are used for high pressure and low speed application.
 - n) Double piloted 5/2 valve can be used as memory valves in pneumatic circuit design.
