



P.E.S. College of Engineering, Mandya - 571 401

(An Autonomous Institution affiliated to VTU, Belagavi)

Seventh Semester, B.E. - Mechanical Engineering

Semester End Examination; Dec - 2017/Jan - 2018

Hydraulics and Pneumatics

Time: 3 hrs

Max. Marks: 100

Note: Answer **FIVE** full questions, selecting **ONE** full question from each unit.

UNIT - I

- 1 a. Explain briefly the components of Hydraulic Control system with a block diagram. 8
- b. With a neat sketch, explain the working of external gear pump. 8
- c. Find flow rate in units of L/s that an axial piston pump delivers at 1000 rpm. The pump has nine, 15 mm diameter pistons arranged on a 125 mm diameter piston circle. The offset angle is set at 10° and volumetric efficiency is 94%. 4
- 2 a. A hydraulic motor has a displacement of 164 cm^3 and operates with a pressure of 70 bars and a speed of 2000 rpm. If the actual flow rate consumed by the motor is $0.006 \text{ m}^3/\text{s}$ and the actual torque delivered by the motor is 170 N-m. Determine; 10
 - i) Volumetric efficiency
 - ii) Mechanical efficiency
 - iii) Overall efficiency
 - iv) Power developed by the motor in kW.
- b. With a neat sketch, explain construction and working of a Swash plate type in-line axial piston motor. 10

UNIT - II

- 3 a. Explain the working of pressure reducing valve with a neat sketch and also draw symbol. 10
- b. Draw symbols for the following : 10
 - i) Four way, spring centered, three position manually actuated directional control valve
 - ii) Three way, two position DCV
 - iii) Manually actuated two position, spring offset, and four way directional control valve
 - iv) Tandem type centre flow path for three positions, four way directional control valve
 - v) Pressure relief valve.
- 4 a. Explain how oil is regenerated to increase the extending speed of a double acting hydraulic cylinder with a hydraulic circuit diagram? 10
- b. Explain how accumulator is used as an emergency power source and auxiliary power source in fluid power system with circuit diagram? 10

UNIT - III

- 5 a. Explain general type of fluid used in fluid power system. 8
- b. Explain briefly the filters and strainers used in hydraulic system. 8
- c. What do you mean by beta ratio and beta efficiency? 4

- 6 a. With a neat sketch, explain the working of End position cushioning of a double acting cylinder. 10
- b. With a neat sketch, explain Rod less type of Pneumatic cylinder. 10

UNIT -IV

- 7 a. Explain the working of quick exhaust valve with a neat sketch. 8
- b. Explain with suitable circuits the methods used to control the speed of Pneumatic cylinders. 12
- 8 a. Explain with a circuit how 5/3 directional control valve is used as memory valve to control double acting cylinder. 8
- b. With neat diagram, explain the working of the following :
- i) 3/2 sliding spool valve 12
- ii) 5/2 sliding spool valve.

UNIT -V

9. Explain any two of the following with neat sketches :
- a) Oil lubricator 20
- b) Pressure regulator
- c) Air filters.
- 10 a. Draw and explain a two cylinder Pneumatic circuit to control its motion in a Pneumatic system with a motion diagram. 12
- b. Briefly explain the stages involved in production of compressed air for Pneumatic applications. 8

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