



# CBCS SCHEME

17MT53

## Fifth Semester B.E. Degree Examination, Jan./Feb. 2021 Hydraulics and Pneumatics

Time: 3 hrs.

Max. Marks: 100

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

### Module-1

- 1 a. Differentiate between positive displacement pump with dynamic pump. (06 Marks)
- b. State Pascal's law. In a hydraulic press, a force of 100N exerted on the small piston. Determine the upward force on the larger piston. The area of the small piston is  $50 \times 10^2 \text{mm}^2$  and the area of the large piston is  $500 \times 10^2 \text{mm}^2$ . Also find the distance moved by the large piston if the small piston moves by 100mm. (06 Marks)
- c. Explain the construction and working of balanced vane pump. (08 Marks)

OR

- 2 a. A pump supplies oil at  $0.0016 \text{m}^3/\text{s}$  at a 40mm diameter double acting hydraulic cylinder. If the load is 500N and the rod diameter is 20mm, find
  - i) Cylinder KW power during the extending stroke
  - ii) Cylinder KW power during the retraction stroke
  - iii) Pressure during extension and retraction stroke
  - iv) Piston velocity during extension and retraction stroke. (10 Marks)
- b. Derive an expression for the volumetric displacement and theoretical flow rate of bent axis axial piston pump. (10 Marks)

### Module-2

- 3 a. Classify the motor and explain external gear motor with a neat sketch. (10 Marks)
- b. Why cushioning is needed in a hydraulic cylinder? With a neat sketch, explain end cushioning in hydraulic cylinder. (10 Marks)

OR

- 4 a. With a neat sketch, explain the working principle of the solenoid actuation in DCV's. (10 Marks)
- b. Explain the following: i) Pressure relief valve ii) Unloading valve. (10 Marks)

### Module-3

- 5 a. List out desirable properties of hydraulic oil. (04 Marks)
- b. Explain the factors which affecting the sizing of the reservoirs with neat sketch. (08 Marks)
- c. What are sealing devices? Explain the types of sealing devices with neat sketch. (08 Marks)

OR

- 6 a. What is an accumulator? With a neat circuit diagram, explain the applications of accumulators. (10 Marks)
- b. Explain with a neat circuit diagram, the working of a regenerative circuit. (10 Marks)

**Module-4**

- 7 a. With a neat circuit diagram, explain the direct and indirect actuation of pneumatic cylinder. (10 Marks)
- b. Write down the advantages, disadvantages and the applications of the pneumatic systems. (10 Marks)

**OR**

- 8 a. Symbolically represent the following :
- i) Single acting cylinder
  - ii) Push button operated 3/2 DCV
  - iii) Roller operated spring retracted 3/2 limit switch
  - iv) Solenoid actuated and spring reset 5/2 valve
  - v) Variable throttle valve.
- (10 Marks)
- b. With a block diagram, explain three stages of preparation of compressed air. (10 Marks)

**Module-5**

- 9 a. Explain with a pneumatic circuit, the control of extension of a double acting cylinder using OR and AND logic gate. (10 Marks)
- b. With a neat circuit diagram, briefly explain the time dependent retraction without limit switch. (10 Marks)

**OR**

- 10 a. Explain the motion step diagram for a double acting cylinder. (10 Marks)
- b. What is an electrical relay? How does it work? Explain the brief with a neat sketch. (10 Marks)

\*\*\*\*\*