

THIRD SEMESTER DIPLOMA EXAMINATION IN ENGINEERING/TECHNOLOGY

FLUID MECHANICS AND PNEUMATICS

(Common for ME and TD)

Time : 3 hrs

Maximum marks : 100

PART - A

(Answer in One or Two sentences each - 2 marks each)

I

- a) State Newton's Law of Viscosity
- b) Differentiate laminar and turbulent flow
- c) Name the hydraulic coefficients and state the relationship between them
- d) Define Flash Point and Fire point
- e) In Pneumatics, how the port openings are designated in a Direction control valve

PART - B

(Answer any Five questions - 6 marks each)

II

- a) Define the following properties of fluids.
 - i) Specific weight
 - ii) Kinematic viscosity
 - iii) Surface tension
 - iv) Capillarity
- b) Derive an expression for finding total pressure on an inclined surface immersed in a fluid
- c) State Bernoulli's equation and write the assumptions made for its derivation
- d) List the major and minor losses in a pipe flow and write the equation to determine each losses
- e) Explain the working of an external gear pump with a simple sketch
- f) List any six functions of Control valves in a hydraulic circuit
- g) Explain with figure the working of Solenoid operated pneumatic valve

PART - C

(Answer one question from each unit, 15 marks each)

MODULE I

III

- a) Calculate the Specific weight, Specific mass, Specific volume and Specific gravity of One litre of a liquid weighing 10 N
(6)
- b) A U-tube Mercury manometer is connected to two pipes A and B. The pipe B is 60mm below pipe A. The specific gravity of liquid in Pipe A and B are 1.6 and 0.85 respectively. Mercury level in the left limb is 80mm below the centre of pipe A. Find the pressure difference between the two pipes if the Mercury level difference in two limbs of the manometer is 120mm.
(9)

OR

IV

- a) Find the Gauge pressure and Absolute pressure at a point 4m below the free surface of a liquid of specific gravity 1.4. Assume atmospheric pressure as equivalent to 750mm of Mercury (6)
- b) (i) Define Total pressure (2)
- (ii) A rectangular plane surface 1m wide and 4 m deep is immersed in water in such a way that the plane makes an angle of 30° with the free surface of water. Determine the total pressure when the upper edge of the plate is 2m below the free surface of water. (7)

MODULE II

V

- a) Explain different types of energy of a liquid in motion and give the expression for each of them (6)
- b) A horizontal venturimeter 160mm x 80mm is used to measure the flow of oil of specific gravity 0.8. The reading of differential manometer connected to the inlet and throat is 50mm of mercury. Determine the rate of flow. Assume coefficient of discharge of venturimeter as 0. (9)

OR

VI

- a) List any four difference between an Orifice and a Notch (6)
- b) Water flows through a pipe of 200mm dia and 60m long with a velocity of 2m/s. Find the loss of head due to friction using Darcy's and Chezy's equations. Assume $f = 0.005$ and $C = 55$ (9)

MODULE III

VII

- a) Draw block diagram of a hydraulic system and mark the components (6)
- b) (i) What is an accumulator? (2)
- (ii) Explain the working of Weight loaded accumulator with a Simple sketch (7)

OR

VIII

- a) What is the function of hydraulic accumulators ? (2)
- b) What is the function of hydraulic cylinder ? Explain single acting and double acting cylinder with line sketches (5)
- c) Explain the hydraulic circuit for automatic cylinder reciprocation with a line sketch (8)

MODULE IV

IX

- a) Compare Pneumatic system with hydraulic system (Any six points) (6)
- b) Describe the working of Pneumatic chuck with the help of a pneumatic circuit diagram (9)

OR

X

- a) List any six advantages of Hydro pneumatic system (6)
- b) Explain the working principle of Air controlled hydraulic valve with circuit diagram (9)