

TED (10)–3037

(REVISION—2010)

Reg. No.

Signature

THIRD SEMESTER DIPLOMA EXAMINATION IN ENGINEERING/
TECHNOLOGY—MARCH, 2013

FLUID MECHANICS AND PNEUMATICS

(Common for ME and TD)

[Time : 3 hours

(Maximum marks : 100)

Marks

PART—A

(Maximum marks : 10)

I Answer *all* questions in one or two sentences. Each question carries 2 marks.

1. Define Newtonian and Non-Newtonian fluids.
2. Define surface tension.
3. What is vena contracta ?
4. What is an accumulator ?
5. In pneumatics, how the port openings are designated in a direction control valve ?

(5x2=10)

PART—B

(Maximum marks : 30)

II Answer *any five* questions. Each question carries 6 marks.

1. Explain the relationship between absolute pressure, atmospheric pressure, gauge pressure and vacuum pressure with the help of a diagram.
2. Explain the working principle of Bourden tube pressure gauge with a simple sketch.
3. Differentiate between : (a) Steady and unsteady flow (b) Uniform and Non-uniform flow (c) Compressible and Incompressible flow.
4. List the major and minor losses in a pipe flow and write the equation to determine each losses.
5. Explain the following properties of hydraulic fluids :
(a) Viscosity index (b) Oxidation stability (c) Neutralisation number.
6. Classify the positive displacement pumps and explain the working of a simple piston pump.
7. List the important components of a pneumatic system and explain Air filter with a simple sketch.

(5x6=30)

PART—C

(Answer *one* full question from each unit. Each question carries 15 marks.)

UNIT – I

- III (a) Explain the properties, surface tension and capillarity of liquids. 6
- (b) A U-tube Mercury manometer is connected to two pipes A and B. The pipe B is below pipe A. The difference between the centres of pipes is 50 mm. The specific gravity of liquid in Pipe A and B are 1.7 and 0.88 respectively. Mercury level in the left limb is 100 mm 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 90 mm. 9

OR

- IV (a) Find the gauge pressure, absolute pressure and atmospheric pressure at a point 2.5 m below the free surface of a liquid having density $1.4 \times 10^3 \text{ kg/m}^3$. Assume atmospheric pressure as 740 mm of mercury. Take specific gravity of mercury as 13.6. 6
- (b) (i) Define Total pressure. 2
- (ii) A rectangular plane surface 3 m wide and 5 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 3 m below the free surface of water. 7

UNIT – II

- V (a) Name and define the hydraulic coefficients. State the relationship between them. 6
- (b) Water flows over a rectangular notch 0.9 m wide at a depth of 160 mm and afterwards passes through a triangular right angled notch. Taking discharge coefficients for rectangular and triangular notch as 0.62 and 0.6 respectively, find the depth of water over the triangular notch. 9

OR

- VI (a) List any four difference between an Orifice and a Notch. 6
- (b) Water flows through a pipe of 250 mm dia. and 80 m long with a velocity of 2.5 m/s. Find the loss of head due to friction using Darcy's and Chezy's equations. Assume $f = 0.005$ and $C = 5$. 9

UNIT – III

- VII (a) Sketch and explain the working of a simple globe valve. 6
- (b) Draw block diagram of a hydraulic system and explain the functions of each component. 9

OR

- VIII (a) Explain the working of a screw pump with a simple sketch. 6
- (b) Explain the hydraulic circuit for retraction stroke of automatic cylinder reciprocation with a line sketch. 9

UNIT – IV

- IX (a) Write any six advantages of pneumatic system. 6
- (b) Describe the working of pneumatic chuck with the help of a pneumatic circuit diagram. 9

OR

- X (a) Explain the use of air as a cushion for hydraulic system with the help of a diagram. 6
- (b) Explain the working principle of air controlled hydraulic valve with circuit diagram. 9