

TED (10)–3037

Reg. No.

(REVISION—2010)

Signature

THIRD SEMESTER DIPLOMA EXAMINATION IN ENGINEERING/
TECHNOLOGY—OCTOBER, 2012

FLUID MECHANICS AND PNEUMATICS
(Common for ME and TD)

[Time : 3 hours

(Maximum marks : 100)

PART—A

Marks

I Answer the following questions in one or two sentences. Each question carries 2 marks.

1. Differentiate between absolute pressure and gauge pressure.
2. State Newton's law of viscosity.
3. What is venturimeter ?
4. What are hydraulic actuators ?
5. What is an air cylinder ?

(5×2=10)

PART—B

II Answer *any five* of the following. Each question carries 6 marks.

1. Explain the following :
 - (i) Specific weight
 - (ii) Kinematic viscosity
 - (iii) Capillarity
2. What are Manometers ? Explain and classify simple manometers. Also explain piezometer tube with simple sketch.
3. Explain the concept of continuity equation of a liquid flow.
4. What are the limitations of Bernoulli's theorem ?
5. Explain single acting hydraulic cylinder with a simple sketch.
6. Explain the working of an external gear pump with a simple sketch.
7. Compare hydraulic and pneumatic system (Any six points).

(5×6=30)

PART—C

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

UNIT—I

- III (a) Calculate the specific weight, specific mass, specific volume and specific gravity of 1 litre of a liquid which weighs 10 N. 6
- (b) A differential manometer is connected at two points M and N of two pipes. The centre of pipe N is 2.5 m below the centre of M. The mercury level in the limb connected to pipe M is 1.5 m below the centre of pipe N. Pipe M contains carbon tetrachloride of specific gravity 1.594 under a pressure of 103 kPa and pipe N contains oil of specific gravity 0.8 under a pressure of 172 kPa. If the manometric fluid is mercury, find the difference in mercury level in the manometer. 9

OR

- IV (a) The pressure of a liquid in a pipe line is measured with a mercury manometer having one limb open to the atmosphere. If the difference in the height of mercury in the two limbs is 562 mm, calculate the liquid pressure in N/m^2 kPa, bar and N/mm^2 , when the barometer reads 761 mm of mercury. 6
- (b) (i) State and explain Pascal's law with an application. 4
- (ii) A rectangular plane surface is 3 m wide and 6 m deep. It lies in a vertical plane immersed in water. Determine the total pressure when its upper edge is horizontal and (a) coincide with water surface (b) 2 m below the free surface of water. 5

UNIT—II

- V (a) Water is flowing through a pipe having diameter 180 mm and 80 mm at sections 1 and 2 respectively. The rate of flow through the pipe is 30 lit/s. The section 1 is 5 m above datum and section 2 is 3 m above datum. If the pressure at section 1 is 392.4 kPa, find the intensity of pressure at section 2. 7
- (b) A horizontal venturimeter with inlet diameter 220 mm and throat diameter 120 mm is used to measure the flow of water. The pressure at inlet is 170 kPa and the vacuum pressure at throat is 270 mm of mercury. Find the rate of flow. The value of C_d may be taken as 0.97. 8

OR

- VI (a) Explain the phenomenon of water hammer and list the factors which leads to water hammer. 6
- (b) A horizontal pipe of 120 mm diameter suddenly enlarges to 140 mm diameter. Water flows from the smaller section to larger section at the rate of 25 lit/s. What is the loss of head due to sudden enlargement? If the water flows at the same rate as above, but in the opposite direction what is the loss of head due to sudden contraction? 9

UNIT—III

- VII (a) Draw the symbol of a 4/2 Direction control valve and designate the ports. Also draw the actuation symbols. 5
- (b) Explain the following properties of a hydraulic fluid : 4
- (i) Pour point (ii) Neutralisation number
- (c) Explain the functions of following elements of a hydraulic system : 6
- (i) Oil reservoir (ii) Oil pump (iii) Filter

OR

- VIII (a) With the help of a neat sketch explain the working of a Simple Pressure relief valve. 6
- (b) Draw a hydraulic circuit for extension of robotic arm and explain its working. 9

UNIT—IV

- IX (a) Explain the function of air filter with a simple sketch. 6
- (b) Describe the working of Pneumatic Mandrel with the help of a circuit diagram. 9

OR

- X (a) Classify linear motion type pneumatic actuators based on its piston arrangement and briefly explain each of them. 9
- (b) Describe the working principle of a manually operated 2 way direction control valve with a neat figure. 6