DIPLOMA EXAMINATION IN ENGINEERING/TECHNOLOGY/ MANAGEMENT/COMMERCIAL PRACTICE — OCTOBER, 2018

FLUID MECHANICS AND PNEUMATICS

[*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 density of a fluid.
2. State the equation of continuity.
3. What is meant by fluid power ?
4. State the fundamental principles of pressure measuring devices.
5. What is meant by an air cylinder ?   (5×2 = 10)

PART — B

(Maximum marks : 30)

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

1. Explain Absolute, Gauge, Atmospheric and Vacuum pressure.
2. Describe metacentre and metacentric height.
3. Explain the following types of flow:
   (i) Steady and Unsteady flow.
   (ii) Uniform and Non-uniform flow.
4. Explain water hammer.
5. State the applications of hydraulic power.
6. Explain the working of a lobe pump.
7. What are the basic components of a pneumatic system ?   (5×6 = 30)

PART — C

(Maximum marks : 60)

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

Unit — I

III   (a)   A simple manometer containing mercury is used to measure the pressure of oil of specific gravity 0.8 flowing in a pipe. Its right limb is open to atmosphere and left limb is connected to the pipe. The centre of the pipe is 90mm below the level of mercury in the right limb. If the difference of level of mercury in the two limbs is 150mm, find the pressure of oil in the pipe.   8

Marks

(b) Determine total pressure on a circular plate of diameter 2m which is placed vertically in water in such a way that the centre of the plate is 4m below the free surface of water. 7

OR

IV (a) The left limb of a manometer is connected to a pipe in which a fluid of specific gravity 0.9 and having vacuum pressure is flowing. The right limb is open to atmosphere. Find the vacuum pressure in the pipe, if the difference of mercury level in the two limbs is 300mm and the height of fluid in the left from the centre of the pipe is 100mm below. 8

(b) Determine the total pressure in an isosceles triangular plate of the base 4m and altitude 4m when it is immersed vertically in an oil of specific gravity 0.8. The base of the plate coincides with the free surface of oil. 7

UNIT — II

V (a) State Bernoulli's theorem for liquids with its limitations. 8

(b) The head of water over an orifice of diameter 40mm is 10m. Find the actual discharge and actual velocity of the Jet at vena-contracta. Take $C_d = 0.6$ and $C_v = 0.98$. 7

OR

VI (a) A horizontal venturimeter with inlet and throat diameters 300mm and 150mm is used to measure the rate flow of water. The reading of differential manometer connected to the inlet and throat is 200mm of mercury. Determine the rate of flow. Assume Cd = 0.98. 8

(b) A pipe 500m long is conveying water with a velocity of 1m/s. Find the suitable diameter of the pipe, if the head lost due to friction is 3.4m. Take f = 0.01. 7

UNIT — III

VII (a) What are the primary functions of a hydraulic fluid ? 8

(b) Explain the working of a single acting hydraulic cylinder. 7

OR

VIII (a) What are the basic components of a hydraulic system ? 8

(b) Describe the working principle of sliding spool type direction control valve. 7

UNIT — IV

IX (a) Compare pneumatic system with hydraulic system. 8

(b) Explain the working of a pneumatic mandrel. 7

OR

X (a) Explain the working of a lubricator in a pneumatic system. 8

(b) What are the practical applications of pneumatics ? 7

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