

**DIPLOMA EXAMINATION IN ENGINEERING/TECHNOLOGY/
MANAGEMENT/COMMERCIAL PRACTICE, APRIL – 2022**

FLUID MECHANICS & PNEUMATICS

[Maximum Marks: 100]

[Time: 3 Hours]

PART-A

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

1. Define density of a fluid.
2. Define kinematic viscosity.
3. Explain rate of flow or discharge.
4. Define hydraulic intensifier.
5. What is meant by an air cylinder? (5 x 2 = 10)

PART-B

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

1. Calculate the specific weight, density and specific gravity of one litre of liquid which weights 30N.
2. Describe metacenter and metacentric height.
3. What are the limitations of Bernoulli's theorem?
4. Write short notes on head loss due to sudden enlargement with neat sketch.
5. State any six functions of control valves.
6. Explain the working of lobe pump with neat sketch.
7. What are the practical applications of pneumatics? (5 x 6 = 30)

PART-C

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

UNIT – I

- III (a) Explain the relationship between absolute pressure, atmospheric pressure, gauge pressure and vacuum pressure with the help of a diagram. 6
- (b) A simple U-tube manometer containing mercury is connected to a pipe in which a fluid of specific gravity 0.8 and having vacuum pressure is flowing. The other end of the manometer is open to atmosphere. Find the vacuum pressure in the pipe, if the difference of mercury levels in the two limbs is 45cm and the height of the fluid in the left limb from the centre of the pipe is 20cm below. 9

OR

- IV. (a) A circular plate 3m diameter is submerged in water in such a way that its greater and least depth is 2m and 1m respectively. Find the total pressure on the surface of the plate. (6)
- (b) A U-tube mercury manometer is connected to two pipes A & B. Pipe B is 50 mm below pipe A. The Specific gravity of liquid in pipe A & B is 1.2 & 0.80 respectively. Mercury level in the left limb is 75 mm below the centre of pipe A. Find the pressure difference between two pipes in kN/m^2 , if the level difference of mercury in the two limbs of manometer is 120mm. (9)

UNIT – II

- V. (a) Name and define hydraulic coefficients. State the relationship between them. (7)
- (b) A venturimeter with inlet diameter 150 mm and throat diameter 80 mm is laid its axis horizontal and is used to measure the flow of water. The mercury manometer shows a gauge difference measured as 150mm. Assume the coefficient of meter as 0.95. Calculate the discharge. (8)

OR

- VI.(a) What is a notch? Explain the difference between orifice and notch. (6)
- (b) Water is flowing through a pipe of 200mm in diameter and 150mm long with velocity 3m/s. Find the head loss due to friction using Darcy's formula and Chezy's formula. Assume $f=0.007$ and $C=55$. (9)

UNIT- III

- VII. (a) Explain the basic elements of fluid reservoir and their functions with neat sketch. (7)
- (b) Describe the working principle of single and double acting cylinders with neat sketches. (8)

OR

- VIII. (a) With the help of a neat sketch explain the working of 3-way DC valve. (7)
- (b) With the help of neat sketches explain the working of separator and non-separator type accumulator. (8)

UNIT - IV

- IX. (a) Write any seven applications of air cylinders. (7)
- (b) Explain the basic components of a pneumatic system with neat sketch. (8)

OR

- X. (a) What are the advantages of hydro-pneumatic system? (7)
- (b) Explain the working of a pneumatic collet chuck with neat sketch. (8)