

**4TH SEM / AERO/AIR. MAIN.ENG./DIP IN MECH/MECH./MECH(MAINT.)/
MECH(PROD.)/ MECH(SAND.)/ MECH(IND.INT.)/ 2023(s)**

Th3 Fluid Mechanics

Full Marks: 80

Time- 3 Hrs

**Answer any five Questions including Q No.1& 2
Figures in the right hand margin indicates marks**

1. Answer **All** questions 2 x 10
 - a. Define meta centre and meta centric height.
 - b. Write the assumptions made in the derivation of Bernoulli's equation.
 - c. Write and explain Archimedes Principle.
 - d. Define Buoyancy and centre of Buoyancy.
 - e. Differentiate between laminar and turbulent flow.
 - f. Define notch and weir.
 - g. What is Pitot tube? Describe the use of it.
 - h. What is impact of jet?
 - i. Write the statement of Pascal's law.
 - j. Define capillarity.

2. Answer **Any Six** Questions 6 x 5
 - a. Derive the formula of force exerted by a fluid jet on a stationary flat plate placed normal to the jet.
 - b. Define Absolute pressure, gauge pressure, vacuum pressure and atmospheric pressure. Write the relation between them.
 - c. What is Newton's Law of viscosity? Write the relation between Dynamic viscosity and kinematic viscosity.
 - d. The diameter of the pipe at section 1 & 2 are 10cm and 30cm respectively. The velocity at section 1 is 5 m/s. calculate
 - (a) the velocity at section 2
 - (b) discharge through the pipe

- e. What are the different losses of energy in pipes? Write the expression for the head loss due to friction using
 - (a) Darcy's formula
 - (b) Chezy's formula
- f. Define pressure and pressure head.
Calculate the pressure due to a column of 0.4 m of
 - (i) water
 - (ii) an oil of specific gravity 0.9
- g. Define density, Specific weight, specific gravity of a fluid. Write the relation between them.

3 A horizontal venturimeter with inlet diameter 30cm and throat 15cm respectively is used to measure the flow of water. The reading of differential manometer connected to inlet and throat is 10 cm of mercury. Determine the rate of flow. Take $C_d = 0.98$. 10

4 A rectangular plane surface is 2.5 m wide and 4m deep. It lies in vertical plane in water. Determine the total pressure and position of the centre of pressure on the plane surface when its upper edge is horizontal and (a) coincides with water surface (b) 2m below the free water surface 10

5 The right limb of a simple U-tube manometer containing mercury is open to atmosphere while the left limb is connected to a pipe in which oil of specific gravity 0.8 is flowing. The center of pipe is 11cm below the level of mercury in the right limb. Find the pressure of fluid in the pipe of difference of Hg level in the two limbs is 21cm. 10

6 Define orifice. What are the different types of orifices. Write in detail about the flow through an orifice. 10

7 Write short notes on 2 x 5
 (a) Surface tension
 (b) HGL & TEL