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**PRESIDENCY UNIVERSITY  
BENGALURU**

**SCHOOL OF ENGINEERING  
END TERM EXAMINATION - JAN 2023**

**Semester :** Semester III - 2021

**Date :** 5-JAN-2023

**Course Code :** MEC2010

**Time :** 1.00PM - 4.00PM

**Course Name :** Sem III - MEC2010 - Fluid Mechanics

**Max Marks :** 100

**Program :** B.Tech. Mechanical Engineering

**Weightage :** 50%

**Instructions:**

- (i) Read all questions carefully and answer accordingly.
- (ii) Question paper consists of 3 parts.
- (iii) Scientific and non-programmable calculator are permitted.

**PART A**

**ANSWER ALL THE FIVE QUESTIONS**

**5 X 2 = 10M**

**1.** Manometer tube is used for measuring.....

- 1) Discharge
- 2) Pressure
- 3) Velocity
- 4) Density

(CO1) [Knowledge]

**2.** Define center of buoyancy and Metacenter height,

(CO2) [Knowledge]

**3.** Write a brief note on continuity equation.

(CO2) [Knowledge]

**4.** Pitot tube is used for measuring.....

- 1) Discharge
- 2) Pressure
- 3) Velocity
- 4) Density

(CO3) [Knowledge]

5. Which of the following method is used exclusively used in control volume?

- 1) Eulerian method
- 2) Lagrangian method
- 3) Neither Lagrangian nor Eulerian method
- 4) Both Lagrangian and Eulerian methods

(CO4) [Knowledge]

## PART B

### ANSWER ALL THE SIX QUESTIONS

**6 X 10 = 60M**

6. Define compressibility, Bulk modulus, surface tension and shear stress.

(CO1) [Comprehension]

7. List and brief at least five types of fluid flow.

(CO2) [Comprehension]

8. A solid cylinder of 2m diameter and 1m height is made-up of material of specific gravity 0.7 and floats in water. Find its metacentric height. Determine the type of equilibrium the body undergoes.

(CO3) [Comprehension]

9. Define Surface tension, Viscosity, Shear stress, Density and Capillarity.

(CO4) [Comprehension]

10. Explain and prove Pascals law with a neat sketch.

(CO4) [Comprehension]

11. Explain the relation between Absolute, Gauge, Atmospheric and Vacuum pressures with a neat sketch.

(CO4) [Comprehension]

## PART C

### ANSWER ALL THE TWO QUESTIONS

**2 X 15 = 30M**

12. (a) An orifice meter with orifice diameter 15cm is inserted in a pipe of 30cm diameter. The pressure difference measured by a mercury oil differential manometer on the two sides of the orifice meter gives a reading of 50cm of mercury. Find the rate of flow of oil of sp. gr. 0.9 when the coefficient of discharge of the orifice meter is 0.64

(b) Find the velocity of oil flowing through a pipe, when the difference of mercury level in a U-tube differential manometer connected to the two tapping's of the pitot tube is 40mm. Take coefficient of pitot tube 0.98 and sp. gr. of oil as 0.7.

(CO3) [Application]

13. (a) An oil of specific gravity 0.8 is flowing through a venturimeter having inlet diameter 30cm and throat diameter 10cm. The oil-mercury differential manometer shows a reading of 25cm. Calculate the discharge of oil through the horizontal venturimeter. Take  $C_d = 0.98$ .

(b) A garden hose attached to the nozzle is used to fill a bucket of  $0.07385 \text{ m}^3$ . The inner diameter of the hose is 2 cm which reduces to 0.8cm at the exit of the nozzle. Assume it takes 50 seconds to fill the bucket. Determine volume flow rate and mass flow rate of water through the hose in metric unit. Also determine average velocity of water at nozzle exit.

(CO4) [Application]

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