PRESIDENCY UNIVERSITY
BENGALURU   **SET B**

SCHOOL OF ENGINEERING
END TERM EXAMINATION - JAN 2024

Semester : Semester III - 2022   **Date :** 08-JAN-2024
Course Code : CIV2009   **Time :** 9:30AM - 12:30 PM
Course Name : Fluid Mechanics   **Max Marks :** 100
Program : B.Tech.   **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.
(iv) Do not write any information on the question paper other than Roll Number.

PART A

**ANSWER ALL THE QUESTIONS**   **5 X 4M = 20M**

1. State Newton's law of viscosity and show the variation of fluid velocity with respect to depth as per Newton's law of viscosity.

    (CO1) [Knowledge]

2. With the help of velocity vs time graph differentiate steady flow and unsteady flow

    (CO2) [Knowledge]

3. With neat sktech exaplain the loss of energy due to sudden enlargement of a pipe.

    (CO3) [Knowledge]

4. State Bernoulli's equation and list any two assumptions made for derivation ofBernoulli's equation.

    (CO2) [Knowledge]

5. State Archimedes' principle and give the equation to calculate buoyancy force based on Archimedes' principle

    (CO1) [Knowledge]

PART B

ANSWER ALL THE QUESTIONS   **5 X 10M = 50M**

6. Venturimeter is a device used to measure the flow rate or discharge of fluid through a pipe. Venturimeter is an application of Bernoulli's equation.With neat diagram explain the working principle of Venturimeter

                                                                (CO2) [Comprehension]

7. Water is flowing through a pipe of 5 cm diameter under a pressure of 29.43 Newton per square centimeter and with mean velocity of 2.0 m/s. Find the total head or total energy per unit weight of the water at a cross section , which is 5 m above the datum line.

                                                                (CO2) [Comprehension]

8. A crude oil is flowing through a pipe of diameter 300 mm at the rate of 300 liters/sec. Find the head loss due to friction for a length of pipe 50 m. Take kinematic viscosityof crude oil = 0.4 stoke

                                                                (CO3) [Comprehension]

9. A simple U-tube manometer attached to an air pipe shown in figure. If the specific gravity of one fluid is 13.55, determine the specific gravity of the other fluid for the indicated absolute pressure of air. Take atmosphere pressure to be 100 kPa.
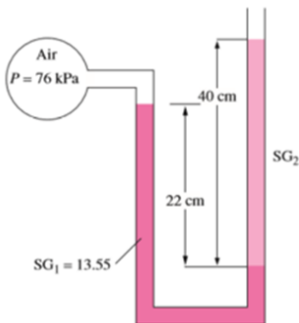
                                                                (CO1) [Comprehension]

10. Identify the nature of flow based on Reynold's number. If a fluid of viscosity 0.4 Newton sec per meter square and relative density of 900 Kg per cubic meter, flows through a 20 mm diameter pipe with a Velocity of 2.5 m/s. Also show the flow pattern with the help of neat sketch.

                                                                (CO1) [Comprehension]

PART C

ANSWER ALL THE QUESITONS   **2 X 15M = 30M**

11. The difference in water surface levels in two tanks, which are connected by three pipes in series of lengths 300 m, 170 m and 210 m and of diameters 300 mm, 200 mm and 400 mm respectively, is 12 m. Determine the rate of flow of water if co-efficient of friction are 0.005 , 0.0052 and 0.0048 respectively, considering:
    a) Minor losses also b) Neglecting minor losses.

                                                                (CO3) [Application]

12. At a sudden enlargement of water main from 240 mm to 480 mm diameter, the hydraulic gradient rises by 10 mm. Estimate rate of flow

                                                                (CO3) [Application]