**Code No. PC406CE**

**METHODIST COLLEGE OF ENGINEERING & TECHNOLOGY**

**(An Autonomous Institution)**

**B.E. (CIVIL) IV-Semester (AICTE) Regular Examination, AUGUST-2023**

**Subject: FLUID MECHANICS**

**Time: 3 hours Max.Marks:60**

**Note: Missing data, if any, maybe suitably assumed.**

**PART-A**

**Answer All the questions. (10X2M=20M)**

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| **Q.No.** | **Questions** | **Marks** | **CO** | **BTL** |
| **1. a** | Define Dynamic Viscosity of fluids. | 2M | CO1 | L1 |
| **b** | State Pascal’s law. | 2M | CO1 | L1 |
| **c** | Differentiate Steady flow and Unsteady flow with examples. | 2M | CO2 | L2 |
| **d** | Write properties of Stream function. | 2M | CO2 | L2 |
| **e** | List outApplication’s of Bernoulli’s equation for incompressible flow. | 2M | CO3 | L1 |
| **f** | Explain Free vortex flow with example. | 2M | CO3 | L2 |
| **g** | State the Principle on which Venturimeter works. | 2M | CO4 | L1 |
| **h** | Differentiate Notch and Weir. | 2M | CO4 | L2 |
| **i** | Write the dimensions for Force and Dynamic Viscosity. | 2M | CO5 | L2 |  | L4 |
| **j** | List out the uses of Dimensional analysis. | 2M | CO5 | L1 |

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**PART-B**

**Answer Any Five questions**. **(5X8M=40M)**

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| **Q.No.** |  | **Questions** | **Marks** | **CO** | **BTL** |
| **2.** | **a** | What is the pressure within a droplet of water 0.05 mm diameter at 20ºC.If the pressure outside the droplet is standard atmospheric pressure of 1.03 kg (f)/cm2.Given σ as 0.0075kg (f)/m for water at 20ºC. | 3M | CO1 | L3 |
| **b** | Explain the procedure of Differential Manometer with a neat sketch. | 5M | CO1 | L2 |
| **3.** | **a** | Develop an equation of Continuity for a three dimensional flow of an incompressible fluid. | 6M | CO2 | L3 |
| **b** | Explain Rotational and Irrational flows with examples. | 2M | CO2 | L2 |
| **4.** | **a** | Derive Euler’s equation for a fluid element along a Stream line. | 5M | CO3 | L3 |
| **b** | The water is flowing through a tapered pipe of length 100 m having a diameter of 600 mm at the upper end and 300 mm at the lower end, at a rate of 50 litres/sec. The pipe has a slope of 1 in 30. Find the pressure at the lower end if the pressure at the higher level is 19.62 N/cm2. | 3M | CO3 | L3 |
| **5.** | **a** | Develop an expression for discharge through an Orifice. | 4M | CO4 | L3 |
| **b** | A horizontal Venturimeter with an inlet diameter 20 cm and a throat diameter 10 cm is used to measure the flow of oil of sp.gr.0.8. The discharge of oil through the Venturimeter is 60 litres/sec. Find the reading of the oil-mercury differential manometer. Take Cd as 0.98. | 4M | CO4 | L3 |
| **6.** | **a** | Write about Similitudes in dimensional analysis. | 3M | CO5 | L2 |
| **b** | Develop an equation for discharge Q, through a sharp edged Triangular Notch assuming Q depends on the central angle α of the notch, head H, gravitational acceleration g, and the density ρ, viscosity µ, surface tension σ, of the fluid. | 5M | CO5 | L3 |
| **7.** | **a** | The Capillary rise in the glass tube is not to exceed 0.2 mm of water. Find the minimum size of glass tube, given that surface tension of water in contact with air is 0.0725 N/m. | 2M | CO1 | L3 |
| **b** | A stream function for a two-dimensional flow is ψ = 2xy.Find the corresponding velocity potential. | 6M | CO2 | L3 |
| **8.** | **a** | The water is flowing through a pipe having diameters 20cm and 10 cm at section 1 and 2 respectively. The rate of flow through the pipe is 35 liters/sec. The section 1 is 6 m above the datum line and section 2 is 4 m above the datum line. If the pressure at section 1 is 39.24 N/cm2, find the intensity of pressure at section 2. Neglect losses. | 4M | CO3 | L3 |
| **b** | Discuss about Rotameter with a neat sketch. | 4M | CO4 | L2 |
| **9.** | **a** | Explain Buckingham Pi theorem for Dimensional analysis. | 5M | CO5 | L2 |
| **b** | Find the discharge of water flowing over a Rectangular notch of 2 m length when the constant head over the notch is 300 mm. Consider Cd to be 0.60. | 3M | CO4 | L3 |

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