

Total No. of Questions: 6

Total No. of Printed Pages: 2

Enrollment No.....



Faculty of Engineering
End Sem Examination Dec-2023
CE3CO19 Fluid Mechanics

Programme: B.Tech.

Branch/Specialisation: CE

Duration: 3 Hrs.

Maximum Marks: 60

Note: All questions are compulsory. Internal choices, if any, are indicated. Answers of Q.1 (MCQs) should be written in full instead of only a, b, c or d. Assume suitable data if necessary. Notations and symbols have their usual meaning.

- Q.1 i. Which one of the following is the unit of specific weight? **1**
(a) N/m^3 (b) N/m^2 (c) N/m (d) None of these
- ii. The specific volume of a liquid is the reciprocal of- **1**
(a) Weight density (b) Mass density
(c) Specific weight (d) No unit
- iii. Which is the cheapest device for measuring flow / discharge rate? **1**
(a) Venturimeter (b) Pitot tube
(c) Orificemeter (d) None of these
- iv. The Bernoulli's equation in fluid dynamics is valid for _____. **1**
(a) Compressible flows (b) Transient flows
(c) Continuous flows (d) Viscous flows
- v. Which among the following have the same forces acting on them? **1**
(a) Dynamic similarity (b) Geometric similarity
(c) Conditional similarity (d) Kinematic similarity
- vi. Which of the following is the mathematical technique used to predict physical parameters? **1**
(a) Dimensional analysis (b) Temperature analysis
(c) Pressure analysis (d) Combustion analysis
- vii. Which property of the fluid accounts for the major losses in pipes? **1**
(a) Density (b) Specific gravity
(c) Viscosity (d) Compressibility
- viii. Which one of the following is a major loss? **1**
(a) Frictional loss (b) Entry loss
(c) Exit loss (d) None of these

[2]

- ix. What is the dimension of C? **1**
(a) LT (b) $\text{L}^{1/2} \text{T}^{-1}$ (c) LT^{-1} (d) $\text{L}^{-1} \text{T}^{-1}$
- x. Calculate the mean hydraulic radius for a channel having 40m^2 cross sectional area and 80m of wetted perimeter. **1**
(a) 0.4 (b) 0.5 (c) 0.6 (d) 0.7
- Q.2 i. Define density, specific gravity. **2**
ii. Write short note on viscosity and elasticity. **2**
iii. A rectangular plane surface is 2 m wide and 3 m deep. It lies in vertical plane in water. Determine the total pressure and position of centre of pressure on the plane surface when its upper edge is horizontal **6**
(a) Coincide with water surface (b) 2.5 m below the free surface.
- OR iv. Explain with neat sketches the conditions of equilibrium for floating and submerged bodies. **6**
- Q.3 i. Explain the terms velocity potential function and stream function. **3**
ii. Deduce an expression for Bernoulli's equation and also mention its applications. **7**
- OR iii. Derive the expression for actual discharge through Venturimeter. **7**
- Q.4 i. Define dimensional analysis. Write the uses of dimension analysis. **4**
ii. Explain Buckingham's π theorem for dimensional analysis. **6**
- OR iii. Explain the types of similarities or similitude used in model analysis. **6**
- Q.5 i. Write short note on hydraulic gradient line and total energy line. **4**
ii. Explain the concept of water hammer effect and its prevention. **6**
- OR iii. Derive an expression for Darcy's Weisbach equation. **6**
- Q.6 Attempt any two: **5**
i. Derive all the conditions for most economical rectangular section. **5**
ii. Derive an expression for Chezy's formula for open channel flow. **5**
iii. Find the velocity of flow and rate of flow of water through a rectangular channel of 6m wide and 3m deep, when it is running full. The channel is having bed slope as 1 in 2000. Take Chezy's constant $C=55$. **5**

P.T.O.