

**SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY:: PUTTUR**  
(AUTONOMOUS)  
**B.Tech II Year I Semester Regular & Supplementary Examinations December-2023**  
**FLUID MECHANICS**  
(Civil Engineering)

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

(Answer all Five Units 5 x 12 = 60 Marks)

**UNIT-I**

- 1 Define the physical properties of fluids and Write its units. CO1 L2 12M
- OR**
- 2 a Explain the phenomenon of capillarity. Obtain an expression for capillary rise of aliquid. CO1 L2 6M
- b Two horizontal plates are placed 1.25cm apart, the space between them filled with oil of viscosity 14 Poise. Calculate the Shear Stress in oil if upper plate is moved with velocity of 2.5 m/sec. CO1 L3 6M

**UNIT-II**

- 3 Derive Continuity Equation in 3-Dimensional flow. CO2 L3 12M
- OR**
- 4 The Velocity Potential function ( $\phi$ ) is given by an expression CO2 L3 12M
- $$\phi = \frac{-xy^3}{3} - x^2 + \frac{x^3y}{3} + y^2$$
- i. Find the velocity components in x and y direction.
- ii. Show that  $\phi$  remains represents the possible case of flow.

**UNIT-III**

- 5 Derive the Euler's equation of motion along a stream line with assumptions. CO3 L3 12M
- OR**
- 6 a Derive an expression for the discharge over a rectangular notch. CO4 L3 6M
- b Water flows through right angled weir first and then over a rectangular weir of width 1m. The discharge coefficient of the triangular and rectangular weirs are 0.6 and 0.7. If the depth of water over triangular weir is 360mm. find the depth of water of rectangular weir. CO4 L3 6M

**UNIT-IV**

- 7 A horizontal pipe line 40m long is connected to the water tank at one end and discharges freely into the atmosphere at the other end. For the first 25 m of its length from the tank pipe is 150mm and its dia is suddenly enlarged to 300mm. the height of water level in the tank is 8m above the center of pipe considering all losses of head which cover occur. Determine the rate of flow. Take  $f = 0.01$ , for both sections of the pipe? CO4 L3 12M

**OR**

- 8 Briefly explain about Hardy cross method. CO5 L3 12M

**UNIT-V**

- 9 Explain in detail about Reynolds experiment. CO6 L2 12M
- OR**
- 10 Water is flowing through a rough pipe of 500mm diameter and length 4000m at the rate of  $0.5 \text{ m}^3/\text{s}$ . find the power required to maintain this flow. Take average height of roughness as  $k = 0.4\text{mm}$ . CO6 L3 12M

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