

Reg. No: 

--	--	--	--	--	--	--	--	--	--

**SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY:: PUTTUR**

(AUTONOMOUS)

**B.Tech II Year I Semester Supplementary Examinations December-2021****FLUID MECHANICS**

(Civil Engineering)

Time: 3 hours

Max. Marks: 60

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

**UNIT-I**

- 1 a Define specific density, Surface tension and Capillarity. 6M
- b The space between two square flat parallel plates is filled with oil. Each side of the plate is 60 cm. The thickness of the oil film is 2.5mm. The upper plate which moves at 2.5 m/sec requires a force of 9.81N to maintain the speed. Determine dynamic viscosity of the oil in poise and kinematic viscosity of oil if specific gravity of oil is 0.95 6M

**OR**

- 2 a A U-tube manometer is used to measure the pressure of water in a pipe line, which is excess of atmospheric pressure. The right limb of manometer contains mercury and is open to atmosphere. The contact between water and mercury is in the left limb. Determine the pressure of water in the main line, if the difference in the level of mercury in the limbs of U-tube is 10 cm and the free surface of mercury is in level with the center of pipe. If the pressure of water in pipe line is reduced to 9810 N/m<sup>2</sup>, calculate the new difference in the level of mercury. Sketch the arrangements in the both cases. 6M
- b Derive expressions for the total pressure and centre of pressure for an inclined plane surface submerge in the liquid. 6M

**UNIT-II**

- 3 a Define stream line, streak line and path line, stream tube and control volume? 6M
- b If for a two – dimensional potential flow, the velocity potential is given by  $\phi = x(2y - 1)$ . Determine the velocity at the point p (4, 5). Determine also the value of stream function  $\Psi$  at the point p. 6M

**OR**

- 4 a A 30 cm diameter pipe, conveying water, branches into two pipes of diameters 20 cm and 15 cm respectively. If the average velocity in the 30 cm diameter pipe is 2.5 m/s. Find the discharge in the pipe. Also determine the velocity in 15 cm pipe if the average velocity in 20 cm diameter pipe is 2 m/s. 6M
- b Water is flowing through a pipe has diameter 300 mm and 200 mm at the bottom and upper end respectively. The intensity of pressure at the bottom end is 24.525 N/cm<sup>2</sup> and the pressure at the upper end is 9.81 N/cm<sup>2</sup>. Determine the difference in datum head if the rate of flow through pipe is 40 lit/s. 6M

**UNIT-III**

- 5 a Derive the expression for head loss in pipes due to friction by Darcy - Weisbach equation and chezy's formula 6M
- b Find the loss of head when a pipe of diameter 200 mm is suddenly enlarged to a diameter of 400 mm. The rate of flow of water through the pipe is 250 lit/s. 6M

OR

- 6 a Find the head lost due to friction in a pipe of diameter 300 mm and the length 50 m, 6M  
through which water is flowing at velocity of 3 m/s using i) Darcy formula  
ii) Chezy's formula for which  $C=60$  and kinematic viscosity 0.01 stokes?
- b Derive the expression for flow through pipes in series. 6M

## UNIT-IV

- 7 a A board-crest weir of 50m length, has 50cm Height of water above its crest. Find the 6M  
maximum discharge take  $C_d=0.60$  neglect velocity approach (ii) If the velocity approach  
is to be taken in to the consideration, find the maximum discharge when the channel has  
a cross sectional area is  $50\text{m}^2$  on a upstream side.
- b Find the expression for the Discharge over a Rectangular notch or weir. 6M

OR

- 8 a Water flows over a rectangular weir 1m wide at a depth of 150mm and afterwards passes 6M  
through a triangular right-angled weir. Taking  $C_d$  for the rectangular and triangular weir  
as 0.62 and 0.59 respectively .find the depth over a triangular weir.
- b What is a notch and a weir? Explain about Classifications of notch and a weir? 6M

## UNIT-V

- 9 a Derive the equation for the flow of viscous fluid between two parallel plates? 8M  
b Explain the separation of Boundary layer? 4M

OR

- 10 a An oil of viscosity 0.1 Ns/m<sup>2</sup> and relative density 0.9 is flowing through a circular pipe 8M  
of diameter 50mm and length 300 m. The rate of flow of fluid through a circular pipe is  
3.5 lit/sec. Find the pressure drop in a length of 300m and also the shear stress at the pipe  
wall?
- b Explain boundary layer thickness and displacement thickness 4M

\*\*\* END \*\*\*