O.P.Code:23CE0107	R23	H.T.No.									

SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY:: PUTTUR

(AUTONOMOUS)

B.Tech. II Year I Semester Regular Examinations February-2025

FLUID MECHANICS

(Civil Engineering)

Time: 3 Hours **Max. Marks: 70**

PART-A

(Answer all the Questions **10 x 2 = 20** Marks)

1	a	Define the term Specific gravity.	CO1	L1	2M
	b	What is capillarity?	CO1	L1	2M
	c	Define fluid pressure.	CO2	L1	2M
	d	Define the term buoyancy.	CO2	L1	2M
	e	Write the formula for three dimensional continuity equation.	CO4	L1	2M
	f	Define streak line	CO3	L1	2M
	g	Write the Bernoulli's equation for steady irrotational flow of incompressible fluid.	CO5	L1	2M
	h	Define vortex flow.	CO5	L1	2M
	i	Write the Darcy –Weisbach formula.	CO6	L1	2M
	j	Define total energy line.	CO5	L1	2M

PART-B

(Answer all Five Units **5 x 10 = 50** Marks)

UNIT-I

2	a	Derive the expression for surface tension on liquid droplet and soap bubble.	CO1	L3	5M
	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	L4	5M

OR

3	a	Define the term vapour pressure. How does it vary with temperature?	CO1	L2	5M
	b	Calculate the capillary rise in a glass tube of 2.5mm diameter when immersedvertically in i) water & ii) mercury .Take surface tension is 0.0725 N/m^2 for water and 0.52 N/m^2 for mercury in contact with air. The specific gravity for mercury is given as 13.6 & angle of contact is 130^0	CO1	L4	5M

UNIT-II

4	a	Explain briefly the working principle of U-Tube manometer with a neat sketch.	CO2	L2	5M
	b	Discuss about stability of floating bodies.	CO2	L2	5M

OR

5		A rectangular plane surface is 2m wide and 3m deep it lies in vertical plane in water. Calculate the Total pressure and position of Centre of pressure on the plane surface when its appear edge is horizontal and: i) Coincides with water surface ii) 2.5 m below the free surface.	CO2	L4	10M

UNIT-III

6	a	Explain in detail about different types of fluid flows.	CO3	L2	6M
	b	The dia. of pipe at the section 1 & 2 are 10 cm and 15 cm respectively. Find the discharge through the pipe. If the velocity of water flowing through the pipe at section 1 is 5 m/s. Determine also the velocity at the section 2.	CO3	L3	4M

OR

7	a	Explain the continuity equation for One-dimensional flow in terms of Rate of flow.	CO4	L2	5M
	b	A stream function is given by $\psi = 5x - 6y$. Calculate the velocity components and also magnitudeand direction of the resultant velocity at any point.	CO3	L3	5M

UNIT-IV

8		State Bernoulli's theorem for steady flow of an incompressible fluid. Derive the expression for Bernoulli's theorem from first principle and state the assumption made for such a derivation.	CO5	L3	10M

OR

9	a	Derive the expression for actual discharge through venturimeter.	CO5	L3	6M
	b	Define the following i) Froude number ii) Mach number	CO5	L1	4M

UNIT-V

10		Find the head lost due to friction in a pipe of dia 300mm & length 50m through which water is flowing at a velocity of 3 m/s using : i) Darcy's formula ii) Chezy's formula for which C = 60. Take kinematic viscosity of for water = 0.01 stoke	CO6	L3	10M

OR

11	a	Derive the expression for flow through pipes in series.	CO6	L3	5M
	b	A crude oil of kinematic viscosity 0.4 stoke is flowing through a pipe of dia 300mm at the rate of 300 lit/s. Determine the head lost due to friction for a length of 50m of the pipe?	CO6	L3	5M

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