Code No: P21CET02

HALL TICKET NUMBER

PACE INSTITUTE OF TECHNOLOGY & SCIENCES::ONGOLE
(AUTONOMOUS)
II B.TECH I SEMESTER END REGULAR EXAMINATIONS, JAN - 2023
FLUID MECHANICS
(CE Branch)

Time: 3 hours Max. Marks: 70

Answer all the questions from each UNIT (5X14=70M)

Q.No.		Questions	Marks	CO	KL
		UNIT-I			
1.	a)	Prove the relation between surface tension and pressure inside the pressure of the droplet of the liquid and hallow bubble of the liquid .$P=\frac{4\sigma}{d}$ and $P=\frac{8\sigma}{d}$	[7M]	1	L3
	b)	Explain the procedure to measure the pressure at any two points or two pipes by using U-tube differential manometer with neat sketch.	[7M]	1	L2
		OR			
2.	a)	Derive an expression for force exerted on submerged vertical plane surface by the static liquid and locate the position of centre of pressure.	[7M]	1	L3
	b)	Determine the total pressure and depth of center of pressure on a plane rectangular surface of 2.5m wide and 4.5m deep when its upper edge is horizontal and (i) coincides with water surface (ii) 1.5 m below the free surface of water.	[7M]	1	L4
		UNIT-II			
3.	a)	Explain the fallowing terms briefly and give one example each (i). Steady flow (ii) unsteady flow (iii). uniform flow (iv). non-uniform flow (v). laminar flow (vi) turbulent flow	[7M]	2	L2
	b)	State and derive three dimensional (3D) continuity equation for incompressible fluid.	[7M]	2	L2
		OR			
4.	a)	Derive Euler's equation of motion acting along a stream line. Obtain Bernoulli's equation by its integration. List all assumptions made.	[10M]	2	L3
	b)	The diameter of a pipe at the section 1-1 and 2-2 are 200 mm and 300 mm respectively. If the velocity of water flowing through the pipe at section 1-1 is 4 m/s, find (i). Discharge through the pipe and (ii). Velocity of water at section 2-2.	[4M]	2	L4
		UNIT-III			
5.	a)	Draw a neat sketch of Reynolds apparatus and explain how the laminar flow can be demonstrated with the help of the apparatus.	[7M]	3	L3
	b)	Two parallel plates kept 100 mm apart have laminar flow of oil between them with a maximum velocity of 1.5 m/sec. Calculate discharge per meter width, shear stress at the plates and the difference in pressure between two points 20m apart. Assume viscosity of oil to be 24.5 poise	[7M]	3	L4
		OR			
6.	a)	Derive the expression for the loss of head in a pipe due to friction?	[7M]	3	L3
	b)	A crude oil of kinematics viscosity 0.4 stoke is flowing through a pipe of diameter 300 mm at the rate of 300lit/sec. Find the head lost due to friction for a length of 50m of pipe	[7M]	3	L4

UNIT-IV					
7.	a)	Classify mouth pieces and orifices and also explain briefly with neat sketches.	[10M]	4	L2
	b)	What is pitot tube? How will you determine the velocity at any point with help of pitot tube.	[4M]	4	L2
OR					
8.	a)	Derive an expression for the discharge over a rectangular notch in terms of head of water over the crest of the notch.	[7M]	4	L3
	b)	Water flows through a triangular right angled notch first and over a rectangular notch of 1.5 m width. The co-efficient of discharge of triangular and rectangular notch are 0.6 and o.62 receptively. If the depth of water over the triangular notch is 500 mm, find the depth of water over the rectangular notch.	[7M]	4	L4
UNIT-V					
9.	a)	Explain the following terms: i. Laminar boundary layer ii. Boundary layer thickness iii. Displacement thickness iv. Momentum thickness and v. Energy thickness	[7M]	5	L2
	b)	Explain the phenomenon of separation of boundary layer with a neat sketch	[7M]	5	L3
OR					
10.	a)	Obtain Von Karman momentum integral equation	[7M]	5	L3
	b)	Find the displacement thickness and the momentum thickness for velocity distribution in the boundary layer given by $\frac{u}{U}=\frac{y}{\delta}$	[7M]	5	L4

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