

HALL TICKET NUMBER

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PACE INSTITUTE OF TECHNOLOGY & SCIENCES::ONGOLE
(AUTONOMOUS)

II B.TECH I SEMESTER END SUPPLEMENTARY EXAMINATIONS, JAN - 2023
FLUID MECHANICS
(CE Branch)

Time: 3 hours

Max. Marks: 60

Note: Question Paper consists of Two parts (Part-A and Part-B)

PART-A

Answer all the questions in Part-A (5X2=10M)

Q.No.	Questions	Marks	CO	KL
1	a) Explain how certain insects are able to walk on the surface of water?	[2M]	1	
	b) What do you mean by Absolute pressure head and Gauge pressure head?	[2M]	2	
	c) Differentiate between steady flow and uniform flow	[2M]	3	
	d) List the causes of minor energy losses in flow through pipes	[2M]	4	
	e) What do you understand by the terms of boundary layer and of boundary layer theory?	[2M]	5	

PART-B

Answer One Question from each UNIT (5X10=50M)

Q.No.	Questions	Marks	CO	KL
UNIT-I				
2.	a) Prove the relation between surface tension and pressure inside the pressure of the hallow bubble of the liquid $P = \frac{4\sigma}{d}$	[5M]	1	
	b) Calculate the capillary effect in millimeters in a glass tube of 10mm diameter, when immersed in (i) water, and (ii) mercury. The temperature of the liquid is 20° C and the values of the surface tension of water and mercury at 20° C in constant with air are 0.07 N/m and 0.60 N/m respectively. The angle of contact for water is zero that of for mercury 130°. Take density of water at 20° C as equal to 990 kg/m ³ .	[5M]	1	
OR				
3.	Develop the expression for the rate of increase of pressure in vertical direction is equal to weight density. $\frac{\partial p}{\partial z} = \rho g$.	[10M]	1	
UNIT-II				
4.	Derive an expression for the force exerted on a sub-merged vertical plane surface by the static liquid and locate the position of centre of pressure.	[5M]	2	
	Explain the following terms and give one example each (i). Stream line (ii). Path line (iii). Streak line (iv). Laminar flow (v). Turbulent flow	[5M]	2	
OR				
5.	State and derive continuity equation for incompressible fluid and compressible fluid.(3D)	[10M]	2	
UNIT-III				
6.	State Bernoulli theorem for steady flow of an incompressible fluid. Derive an expression for Bernoulli equation and state the assumptions made.	[10M]	3	
OR				
7.	A 300mm diameter pipe carries water under a head of 200m with a velocity of 3.5 m/s. If the axis of the pipe turns through 45°, find the magnitude and direction of the resultant force at the bend	[10M]	3	

UNIT-IV				
8.		Derive the expression for the loss of head in a pipe (Darcy-Weisbach equation)	[10M]	4
OR				
9.		What do you understand by the total energy line, hydraulic gradient line, pipes in series, pipes in parallel and equivalent pipe.	[10M]	4
UNIT-V				
10.		Explain the principle of venturimeter with neat sketch? Derive an expression for the rate of flow of fluid through it.	[10M]	5
OR				
11.	a)	A rectangular orifice 0.9 m wide and 1.2 m deep is discharge water from a tank. If the water level in the tank is 0.6 m above the top edge of the orifice, find the discharge through the orifice, taking the coefficient of discharge for the orifice = 0.6.	[7M]	5
	b)	Difference between small and large orifice. Obtain an expression for discharge through a orifice	[3M]	5
