Vivekananda College of Engineering & Technology, Puttur [A Unit of Vivekananda Vidyavardhaka Sangha Puttur ®] Affiliated to VTU, Belagavi & Approved by AICTE New Delhi			
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CONTINUOUS INTERNAL EVALUATION - 2

Dept: ME	Sem / Div: 4th	Sub: Fluid Mechanics	S Code: 18ME43
Date: 05/08/2022	Time: 9:30-11:00 am	Max Marks: 50	Elective: N

Note: Answer any 2 full questions, choosing one full question from each part.

QN		Questions	Marks	RBT	CO's
		PART A			
1	a	The stream function for a two-dimensional flow is given by $\Psi = 8.xy$, calculate the velocity at the point **p(4, 5)**. Find the velocity potential function Φ	10	L2	CO2
	b	Derive an expression for the meta-centric height of a floating body	7	L3	CO2
	c	What is similitude?. Explain Geometric and Dynamic similarity?	8	L3	CO4
		OR			
2	a	In a two-dimensional incompressible flow, the fluid velocity components are given by , **u = x-4y and v= - y- 4x** Show that velocity potential exists and determine its form. Find also the stream function.	9	L3	CO2
	b	A solid cylinder of diameter **4.0 m** has a height of **3 metres**. Find the meta-centric height of the cylinder when it is floating in water with its axis vertical. The sp. gr. of the cylinder = 0.6	7	L3	CO2
	c	Frictional torque T of a disc of diameter **D** depends on speed **N**, in a fluid dynamics viscosity **μ** and density of fluid **ρ** in a turbulent fluid flow. By using Bucking-	9	L2	CO4

		ham's Π theorem obtain an expression for **T.**			
		PART B			
3	a	Using Buckingham's Pi-theorem, show that the velocity through a circular orifice is given by $$V = \sqrt{2gH}\ \phi\left[\frac{D}{H}, \frac{\mu}{\rho VH}\right]$$ where "**H**" is the head causing flow, **D** is the diameter of the orifice, **μ** is coefficient of viscosity, **ρ** is the mass density and **g** is the acceleration due to gravity.	13	L2	CO4
	b	Define the terms Dimensional analysis and Model analysis.	4	L3	CO4
	c	A block of wood (specific gravity=0.7) floats in water. Determine the meta-centric height if it's size is 1m ×1m × 0.8m.	7	L3	CO2
		OR			
4	a	The pressure difference **Δp** in a pipe of diameter **D** and Length **L** due to turbulent flow depends on the velocity **V**, viscosity **μ**, density **ρ** and roughness **k**. Using Bucking-ham's Π theorem obtain an expression for **Δp**	9	L2	CO4
	b	Explain Dimensional Homogeneity with examples	8	L2	CO4
	c	The velocity potential function is given by $\Phi = 5\,(x^2 - y^2)$. Calculate the velocity components at the point (4, 5).	8	L3	CO2

Prepared by: Satheesha Kumar K

HOD