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B.M.S. College of Engineering, Bengaluru-560019

Autonomous Institute Affiliated to VTU

January / February 2025 Semester End Main Examinations

Programme: B.E. **Semester: III**
Branch: Aerospace Engineering **Duration: 3 hrs.**
Course Code: 22AS3PCFMS **Max Marks: 100**
Course: FLUID MECHANICS

Instructions: 1. Answer any FIVE full questions, choosing one full question from each unit.
2. Missing data, if any, may be suitably assumed.

Important Note: Completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages. Revealing of identification, appeal to evaluator will be treated as malpractice.

		UNIT - I	*CO*	*PO*	Marks
1	a)	Define the following i) Mass density ii) Specific weight iii) Vapour pressure iv) Cavitation v) Dynamic viscosity and kinematic viscosity	CO 1	PO 1	**10**
	b)	State Pascal's Law and derive an expression for variation of pressure with depth.	CO 2	PO 1 PO 2	**10**
		OR			
2	a)	Define the following i) Specific weight ii) Buoyancy iii) Solids and fluids iv) Intensive properties and extensive properties. Explain with examples v) Newtonian and non-Newtonian fluid	CO 1	PO 1	**10**
	b)	Derive an expression for total pressure and center of pressure on an inclined surface.	CO 2	PO 1 PO 2	**10**
		UNIT - II			
3	a)	Explain any five different types of flows in detail with neat sketches.	CO 1	PO 1	**8**
	b)	The stream function for a dimensional flow is given by $\Psi = 2xy$. Calculate the resultant velocity at P (2, 4). Also, the velocity potential function ϕ.	CO 3	PO 1 PO 2	**12**
		OR			
4	a)	Derive continuity equation for a 3D flow and deduce an expression considering unsteady and incompressible flow.	CO 2	PO 1	**12**

		b)	Define stream line, streak line and path line timeline with a neat sketch	CO 1	PO 1	**8**
			UNIT - III			
	5	a)	State Bernoulli's theorem for steady flow of an incompressible fluid and derive an expression for Bernoulli's equation. Write down all the assumptions involved in its derivation.	CO 2	PO 1 PO 2	**12**
		b)	Write a short note on how velocity is measured using pitot-static tube.	CO 1	PO 1	**8**
			OR			
	6	a)	Differentiate between Venturi meter and Orifice meter with neat sketches.	CO 1	PO 1	**8**
		b)	An oil of specific gravity 0.6 is flowing through a venturi meter having inlet diameter 20 cm and throat diameter of 10 cm. The oil-mercury differential manometer shows a reading of 25 cm. Calculate the discharge of oil through the horizontal venturi meter. Take co-efficient of discharge as 0.98.	CO 3	PO 1 PO 2	**12**
			UNIT – IV			
	7	a)	Define laminar and turbulent flow with a neat sketch.	CO 1	PO 1	**4**
		b)	Deduce an expression for the Hagen-Poiseuille equation considering viscous fluid flow through a circular pipe.	CO 2	PO 1 PO 2	**16**
			OR			
	8	a)	Derive an expression for Darcy-Weisbach equation with proper assumptions and deduce it to Chezy's formula.	CO 2	PO 1 PO 2	**20**
			UNIT - V			
	9	a)	Find the displacement thickness, the momentum thickness and energy thickness for the velocity distribution in the boundary layer given by $\frac{u}{U} = \left(\frac{y}{\delta}\right)^2$. Also calculate the value of δ*/θ.	CO 1	PO 1	**10**
		b)	Explain the procedure of dimensional analysis using the Buckingham Pi Theorem with an example.	CO 3	PO 1 PO 2	**10**
			OR			
	10	a)	Define the following i) Mach number ii) Dimension and unit iii) Primary and secondary dimension with an example	CO 1	PO 1	**8**
		b)	Prove that velocity of sound c=$\sqrt{\gamma RT}$ where, R is gas constant, T is the temperature and γ is specific heat ratio.	CO 3	PO 1 PO 2	**12**

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