U.S.N.										

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: Chemical Engineering **Duration: 3 hrs.**

Course Code: 19CH3DCFME **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)		Prove that internal pressure at any point in a fluid at rest is same in all directions.	*CO 1*	*PO 2*	**06**
	b)		The pressure difference over a U-tube manometer is 2800 N/m^2. If the manometric fluid is having a specific gravity of 1.8 and water is flowing through the pipeline. Compute the manometer reading.	*CO 1*	*PO 2*	**04**
	c)		Deduce barometric equation for isothermal condition using the principles of hydrostatic equilibrium.	*CO 1*	*PO 2*	**10**
			OR			
2	a)		Analyze the variation of viscosity of gases and liquids with temperature with suitable examples.	*CO 1*	*PO 2*	**10**
	b)		Explain the formation of a Boundary layer with a neat sketch.	*CO 1*	*PO 1*	**10**
			UNIT - II			
3	a)		Derive continuity equation for frictionless fluid.	*CO 3*	*PO 2*	**04**
	b)		A 25cm diameter pipe carries oil of specific gravity 0.9 at a velocity of 3m/s. At another section the diameter is 20cm. find the velocity at this section and also the mass flow rate of oil.	*CO 3*	*PO 2*	**06**
	c)		Derive Bernoulli's Equation for frictionless fluid.	*CO 3*	*PO 2*	**10**
			OR			
4	a)		A non-uniform part of pipeline 5m long is laid at the slope of 2in5. The pressure gauges each fitted at the upper and lower ends read 20N/cm^2 and 12.5N/cm^2 respectively. If the diameters at the upper and lower ends are 15cm and 10cm respectively, determine the quantity of water flowing per second.	*CO 3*	*PO 2*	**10**
	b)		Analyze the construction and working principal of a Rotameter	*CO 3*	*PO 2*	**10**

			UNIT - III			
	5	a)	Derive momentum Equation for compressible flow.	*CO2*	*PO 2*	**10**
		b)	Explain the velocity of sound wave in a fluid with suitable illustration.	*CO 2*	*PO 1*	**10**
			OR			
	6	a)	Define Mach number. Compare Sonic, Subsonic and Super Sonic flow.	*CO 2*	*PO 2*	**10**
		b)	Derive an expression for stagnation pressure under adiabatic conditions for a compressible fluid.	*CO 2*	*PO 2*	**10**
			UNIT - IV			
	7	a)	Explain the construction and working principle of a Centrifugal pump.	*CO 4*	*PO 1*	**12**
		b)	Outline the classification of pumps with suitable examples.	*CO 4*	*PO 2*	**08**
			OR			
	8	a)	Write a note of priming, cavitation and NPSH of a pump.	*CO4*	*PO 1*	**08**
		b)	Analyze the characteristic curves of a centrifugal pump.	*CO 4*	*PO 2*	**12**
			UNIT - V			
	9	a)	Illustrate dimensional homogeneity by considering any flow phenomena equation.	*CO 3*	*PO 2*	**08**
		b)	Explain the different methods of dimensional analysis.	*CO 3*	*PO 1*	**12**
			OR			
	10	a)	Discuss the significance of dimensionless numbers used in fluid flow phenomena.	*CO 3*	*PO 2*	**08**
		b)	The pressure difference **ΔP** in a pipe of diameter **D** and length **L** due to viscous flow depends on the velocity **V**, viscosity **μ** and density **ρ.** Deduce a relation for pressure drop using Buckingham ∏ -theorem of dimensional analysis	*CO 3*	*PO 2*	**12**

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