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

Autonomous Institute Affiliated to VTU

August 2024 Semester End Main Examinations

Programme: B.E.   Semester: III
Branch: Chemical Engineering   Duration: 3 hrs.
Course Code: 23CH3PCFME / 22CH3PCFME   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.

			UNIT - I	CO	PO	Marks
1	a)		Enlist the different types of pressure and the unit of pressure.	CO2	PO3	02
	b)		A simple U tube manometer is connected to a pipe in which a fluid is flowing. The right end of the monometer is open to the atmosphere. The difference in mercury levels in the manometer is 20 cm. The center of the pipe is 12 cm below the level of mercury in the right limb. The density of the fluid is 800 Kg/m^3 and the density of mercury is 13,600 kg/m^3. Determine the pressure in the pipe.	CO2	PO3	10
	c)		Enumerate the different fluid properties and flow properties with their units and dimensions.	CO1	PO1	08
			OR			
2	a)		With a neat sketch, derive the hydrostatic law. Obtain the expression of barometric equation for isothermal incompressible fluid.	CO1	PO1	10
	b)		With a neat sketch, explain the different types of manometers and their applications	CO1	PO1	10
			UNIT - II			
3	a)		Derive Euler's equation of motion in a streamline flow. Obtain Bernoulli's equation from it for the incompressible fluids mentioning the assumptions made.	CO3	PO3	10
	b)		A horizontal venturi meter is fitted with a circular pipe of diameter 300mm. Diameter of the throat of venturi meter is 150mm. The loss of head from the entrance to the throat is 1/6th times throat velocity head. The difference in reading of the two limbs of the differential mercury manometer is 30cm. Determine the quantity of water flowing through the pipe in l/s.	CO2	PO3	10
			OR			
4	a)		Prove that the maximum velocity in a circular pipe is twice the average velocity, for viscous laminar flow.	CO3	PO3	10

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.

REAPPEAR EXAMS 2023-24

				CO2	PO3	10
		b)	Due to sudden contraction in the horizontal pipe line from 30 to 25 cm, the pressure changes from 10500 kg/m^2 to 6900 kg/m^2. Calculate the rate of flow, assuming the coefficient of contraction to be 0.65. Following this, if there is a sudden enlargement from 25 cm to 30 cm and if pressure at the section of 25 cm is 6900 kg/m^2, what is the pressure at the enlarged section of 50 cm.			
			UNIT - III			
	5	a)	What is the significance of stagnation point in compressible fluids? Derive an expression for stagnation pressure and temperature.	CO3	PO3	10
		b)	A compressible gas with a velocity of 300 m/s is flowing through a horizontal pipe at a section where the pressure is 6×10^4 N/m^2 absolute and temperature of 40°C. The pipe changes in diameter and at this section the pressure is 9×10^4 N/m^2. Find the velocity of the gas at this section if the flow of the gas is adiabatic. Take R= 287 $J/kg^{\circ}K$ and K=1.4.	CO2	PO3	10
			UNIT – IV			
	6	a)	With a neat sketch explain the principle, construction and working of the centrifugal pump. Elucidate the characteristic curves of the pump.	CO4	PO2	10
		b)	Differentiate between orifice and venturi meter. With a neat sketch, explain the working and construction of the venturimeter and obtain an expression for its rate of discharge.	CO4	PO2	10
			UNIT – V			
	7	a)	The pressure difference ΔP in a pipe of diameter D and length l due to viscous turbulent flow depends on velocity V, viscosity μ, density ρ and roughness k. Using Buckingham π -method obtain an expression for ΔP.	CO3	PO3	10
		b)	Explain any five dimensionless numbers significant for fluid mechanics.	CO3	PO3	10

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