



**VIT**

Vellore Institute of Technology  
(Deemed to be University under section 3 of UGC Act, 1956)

## Continuous Assessment Test – II

Programme Name & Branch: B.Tech Chemical Engineering

Course Name & Code: Momentum Transfer (CHE1005)

Class Number: VL2019201001209 Slot:D2+TD2 Exam Duration: 1.5 hours Maximum Marks: 50

Moody chart can be allowed into the exam hall

Answer all the questions		
S.No.	Question	Marks
1.	Calculate the diameter of a vertical pipe needed for flow of a liquid at a Reynolds number of 1500, when the pressure remains constant throughout the pipe. Kinematic viscosity of the fluid = $2 \times 10^{-3} \text{ m}^2/\text{s}$ .	10
2.	You must size an orifice meter to measure the flow rate of gasoline (SG $\frac{1}{4}$ 0.72) in a 10 inch ID pipeline at 60°F. The maximum flow rate expected is 1000 gallons/min, and the maximum pressure differential across the orifice is to be 10 inch of water. What size orifice should you use?	10
3.	The fixed parallel plates kept at 70 mm apart have laminar flow of oil between them with a maximum velocity 2 m/s. Taking dynamic viscosity of oil to be 19.62 poise, calculate, (i) The discharge per meter width (ii) The shear stress at the plates (iii) The pressure difference between two points 25 m apart (iv) The velocity at 20 mm from the plate (v) The velocity gradient at the plates end	10
4.	Water is to be conveyed at a rate of 250 L/s over a distance of 1.5 km at a head loss of 15 m. Asphalted C.I. pipe ( $\epsilon_s=0.12 \text{ mm}$ ) is suggested to be used. Taking the kinematic viscosity of water as $1 \times 10^{-6} \text{ m}^2/\text{s}$ . Estimate the diameter of the pipe for this purpose.	10
5	A reservoir discharges its liquid content through a horizontal pipeline into the atmosphere. The pipeline consists of two pipes: one of 10 cm diameter and 25 m long and another of 12 cm diameter and 35 m long, connected in series. The friction factor $f=0.02$ for both the pipes. The water level in the tank is 10 m above the centre line of the pipe at the entrance. Considering all the minor losses, (a) Calculate the discharge when the 10 cm diameter pipe is joined to the tank (b) Calculate the discharge when the 12cm dia pipe is joined to the tank (Assume $C_c=0.70$ ).	10

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