VIT
Vellore Institute of Technology

Continuous Assessment Test – I

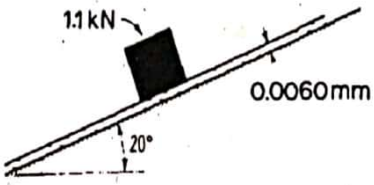
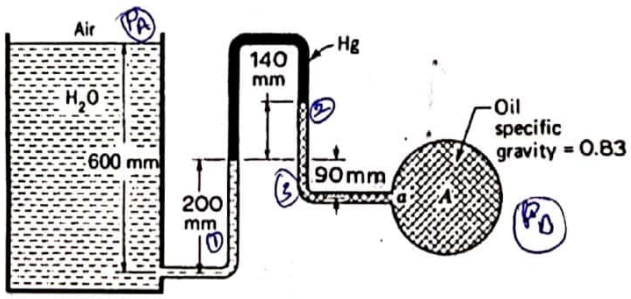
Programme Name & Branch: B.Tech (chemical Engineering)

Course Name & Code: Momentum Transfer, CHE1005

Class Number: VL2019201001176 **Slot:** D1+TD1

Exam Duration: 50 Min **Maximum Marks:50**

General instruction:
Assume suitable data if required.

S.No.	Question
1.	A square block weighing 1.1 kN and 250 mm on an edge slides down an incline on a film of oil 6 μm thick (see Fig 1). Assuming a linear velocity profile in the oil, what is the terminal speed of the block? The viscosity of the oil is 0.007 kg/m sec.  Fig 1.
2.	For the setup shown in Fig 2, calculate the absolute pressure at position 'a'. Assume standard atmospheric pressure, 101.3 kPa.  Fig 2
3.	In a two dimensional incompressible flow, the fluid velocity components are given by u = x-4y and v = -y-4x. Show that velocity potential (φ) exists and determine its form. Also find the stream function (ψ).
4.	In a vertical pipe conveying oil of specific gravity of 0.8, two pressure gauges have been installed at A and B where the diameters are 16 cm and 8 cm respectively. A is 2 meters above B. The pressure gauges readings have shown that the pressure at B is greater than A by 0.981N/cm^2. Neglecting all losses, calculate the flow rate. Refer Fig 3.

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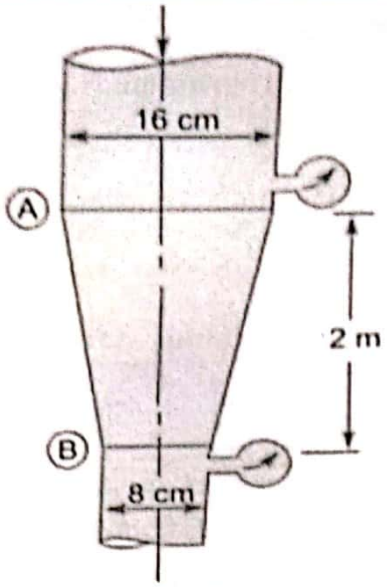

Fig 3.

5. A venturimeter is fitted in a pipe of 30 cm diameter inclined at 40° to the horizontal to measure the flow rate of petrol having a specific gravity of 0.8. The ratio of areas of main pipe and throat is 5 and the throat is at 1 m from the inlet along its length. The difference in manometer head is 40 mm of mercury. Assuming the coefficient of discharge as 0.96. Calculate the discharge through the venturimeter and the pressure difference between the throat and the entry point of the venturimeter. Refer Fig 4.

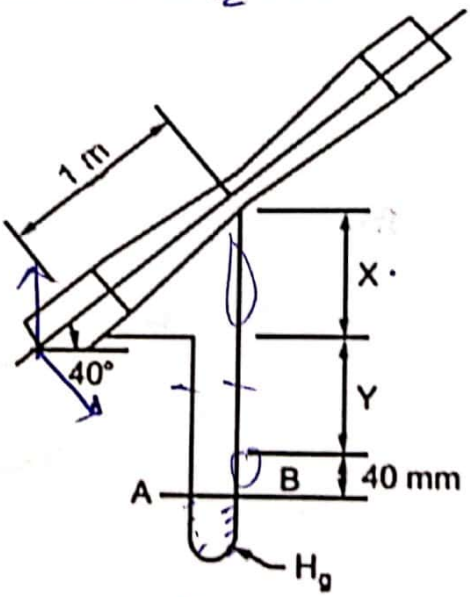

Fig 4.

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