Name: **Enrolment No:**	UPES

UNIVERSITY OF PETROLEUM AND ENERGY STUDIES
End Semester Examination, December 2022

Course: Momentum Transfer — **Semester : III**
Program: B. Tech. (APE-Gas) — **Time : 3 hr**
Course Code: CHCE 2003 — **Max. Marks : 100**

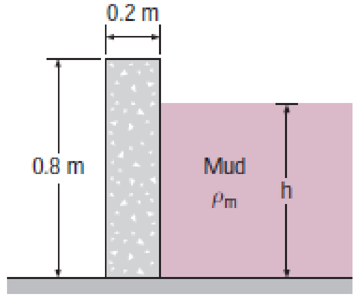
Instructions: Assume any missing data. The notations used here have the usual meanings. Draw the diagrams, wherever necessary.

SECTION - A (5 × 4 = 20 marks)
(Answer all the questions)

S. No.		Marks	CO
1.	Discuss the effect of temperature and pressure on the viscosity of liquids.	4	CO1
2.	What is the Eulerian description of fluid motion? How does it differ from the Lagrangian description?	4	CO2
3.	Define Static, Dynamic, and Stagnation Pressures.	4	CO1
4.	Define the terms: notch, weir, nappe and crest.	4	CO1
5.	Explain the following terms for a centrifugal pump: i) Priming ii) Cavitation	2+2	CO1

SECTION - B (4 × 10 = 50 marks)
(Answer all the questions)

S. No.		Marks	CO
1.	A retaining wall against a mud slide is to be constructed by placing 0.8 m high and 0.2m wide rectangular concrete blocks (ρ = 2700 kg/m^3) side by side, as shown in Fig. The friction coefficient between the ground and the concrete blocks is f = 0.3, and the density of the mud is about 1800 kg/m^3. There is concern that the concrete blocks may slide or tip over the lower left edge as the mud level rises. Determine the mud height at which the blocks will overcome friction and start sliding.	10	CO1

<table>
<tr><td></td><td>
</td><td></td><td></td></tr>
<tr><td>2.</td><td>A cylindrical vessel closed at the top and bottom is 0.24m in diameter, 1.44m long and contains water upto a height of 0.96m. Find the height of paraboloid formed if it is rotated at 480 rpm about its vertical axis.</td><td>10</td><td>CO3</td></tr>
<tr><td>3.</td><td>A hemispherical tank of diameter 4 m contains water upto a height of 1.5 m. An orifice of diameter 50 mm is provided at the bottom. Find the time required by water
(a) to fall from 1.5 m to 1.0 m.
(b) for completely emptying the tank.
The coefficient of discharge is 0.6.</td><td>10</td><td>CO4</td></tr>
<tr><td>4.</td><td>Describe the construction and working of a Centrifugal Pump.</td><td>10</td><td>CO4</td></tr>
<tr><td colspan="4">SECTION – C (2 × 20 = 40 marks)
(Answer all the questions)</td></tr>
<tr><td>1.(a)
(b)</td><td>Explain the principle of venturi meter with a neat sketch.
215 liters of gasoline of specific gravity 0.82 flow per second upward in an inclined Venturimeter fitted at a 300mm diameter pipe. The Venturimeter is inclined at 60^0 to the vertical and its 150mm diameter throat is 1.2m from the entrance along its length. Pressure gauges inserted at the entrance and throat show a pressure of $0.141 N/mm^2$ and $0.077\ N/mm^2$, respectively. Calculate the discharge coefficient of the venturimeter. If instead of pressure gauges at the entrance and throat of the venturimeter are connected to the two limbs of a U-tube mercury manometer, determine the reading in mm of the differential mercury column.</td><td>5

15</td><td>CO4</td></tr>
<tr><td>2.(a)
(b)</td><td>Discuss major and minor losses in flow through pipes.
The difference in water surface levels in two tanks, which are connected by three pipes in series of lengths 300m, 170m and 210 m of diameters 300mm, 200mm, and 400mm respectively is 12m. Determine the rate of flow of water if coefficient of friction are: 0.005, 0.0052 and 0.0048 respectively, considering
(i) both major and minor losses.
(ii) Considering only minor losses.</td><td>5

15</td><td>CO4</td></tr>
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