إسئلة سابقة ..

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لجنة الميكانيك

Polytechnic

Q1) In Bourdon gauge experiment , the following data was recorded . **6 marks**

the piston diameter is **d= 20mm.** $g=9.81\ m/s^2$

No.	Mass Kg	$P_{gauge\ up}$ bar	P_{gauge} down bar			
1	3	0.85	0.87			
2	3.5	1.0	1.0			

a- what is the correction factor

b- what is the amount of mass on the piston for a gauge pressure reading = 0.45 bar

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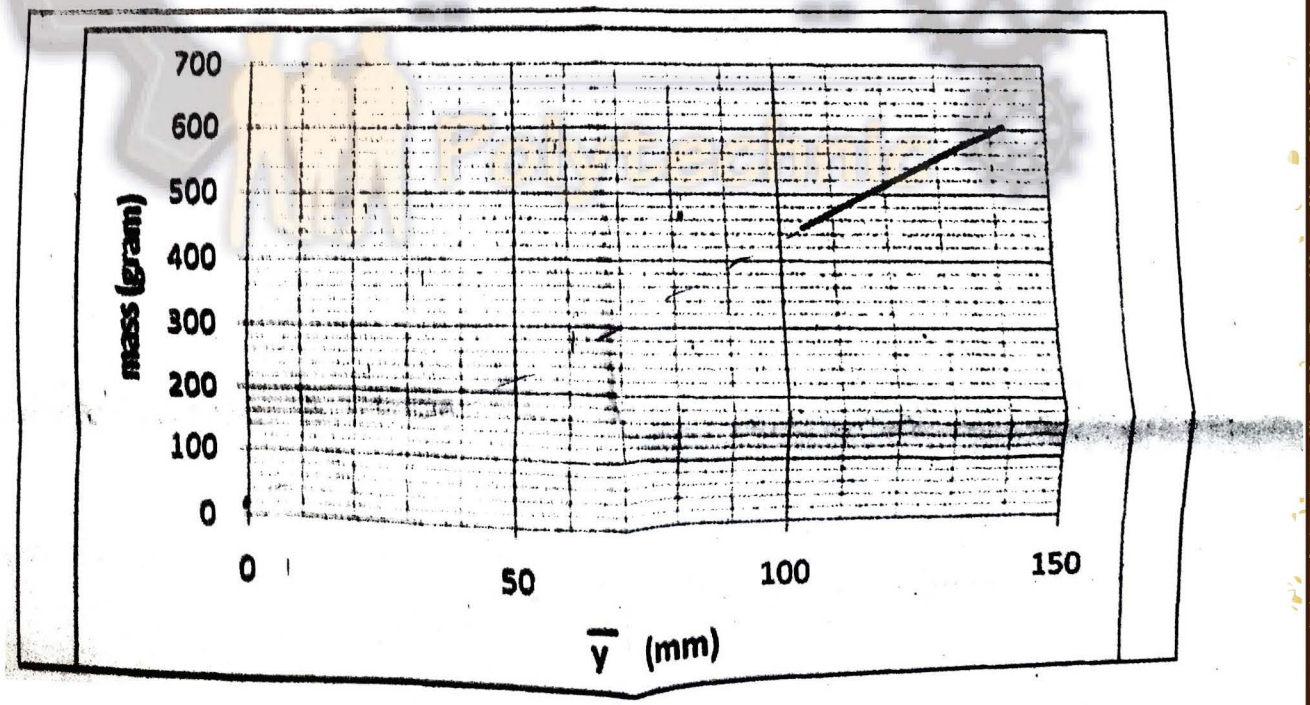
Q2) In center of pressure experiment : **11 marks**

a- prove the following equation **in partial immersion case:** (define all variables and constants)

$$mL = \frac{\rho b y^2}{2}\left(a + d - \frac{y}{3}\right)$$

b- The following graph was obtained **in complete immersion case**, if **L=275 mm and d= 100mm** find the constants parameters **b and a** .



Q3) The following data was recorded in the Venturi experiment : **10 marks**

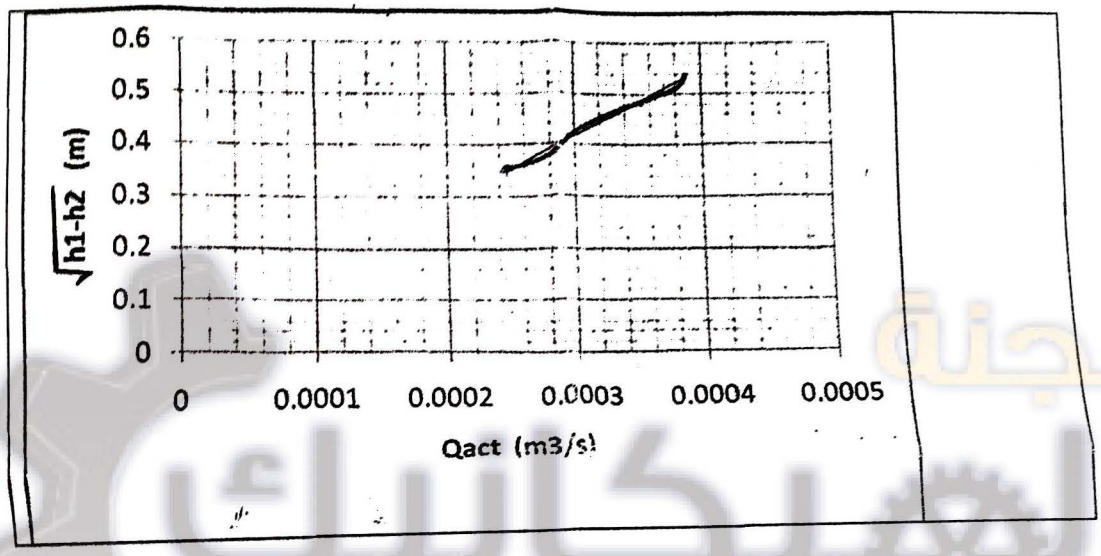
D_1= 32 mm **D_2= 16 mm** **kinematic viscosity ν= 1 X10^{-6} m^2/s**

No.	time s	H_1 mm H_2O	H_2 mm H_2O	volume (L)
1	18.18	470	306	5

a- calculate the venturi coefficient, flow coefficient, by making sample calculation

b- what is the type of flow based on Reynolds number at small cross sectional area .

c- calculate the venturi coefficient from the following graph



Q4) **a-** Three containers A, B, and C filled with three different liquids , container A which was filled with water , the hydrometer immersed length was 80 mm, while in container B the immersed length was 98 mm, and in container C the immersed length was 52mm.

1- calculate the specific gravity for each liquid

2- if the density of water ρ_w = 1000 Kg/m^3 what is the density of the liquids in container B and C and which one is oil and which one is glycerin.

3- what is the effect of increasing the temperature on the density and the kinematic viscosity of the fluid

b- The following data was recorded in **viscosity experiment:**

if diameter of the ball **d=2.95mm** and **mass=0.15 gram** and density of the oil

ρ_L=826 Kg/m^3 . find the average kinematic viscosity of the oil **13 marks**

No.	Time s	L (distance) cm	
1	1.08	100	
2	1.1	100	

Al-Balqa' Applied University

Faculty of Engineering Technology

urse: Fluid mechanics lab. **Midterm- Exam** **Time**

uestion 1

he following data was recorded in viscosity experiment

No.	Time sec	X mm
1	1.28	400
2	1.625	700

If : r =1mm,density of the ball =7800kg/m^3 , density of the glycerin 1370 kg/m
Find the average kinematic viscosity of the glycerin

Question 2

A-The following data was recorded in venturi experiment

No.	T (s)	H_1 (mm H_2O)	H_2 (mm H_2O)	V (mL)
	36.9	307	189	4500

Calculate the venturi coefficient if D_1=2cm and D_2=1cm .

B- Explain how to correct the bourdon gauge reading

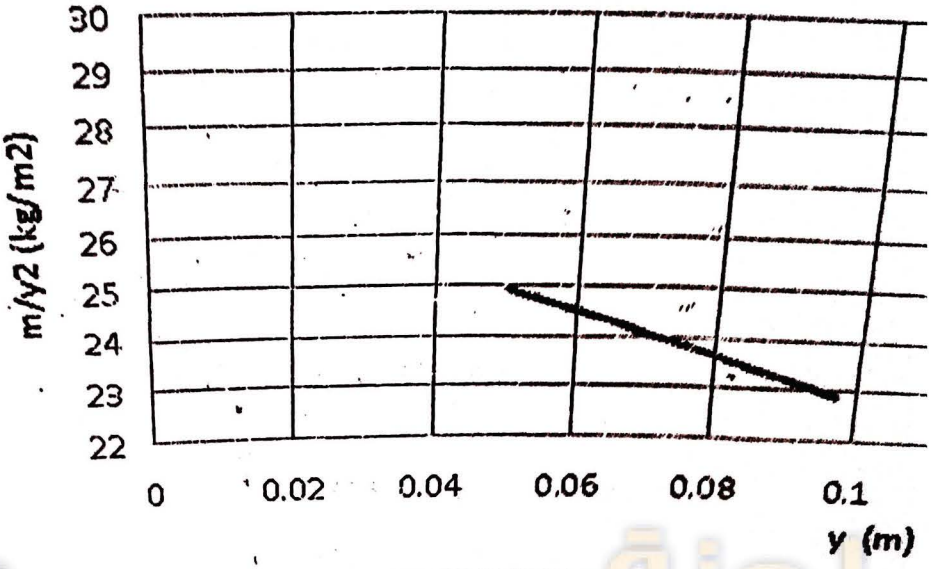
Question 3

If there are four same containers filled with four different liquids. Container A, filled with water, the hydrometer immersed length was 9 cm. In containe hydrometer immersed length was 12 cm, while in container C the immersed len 6cm. while in container D the hydrometer set at the bottom. Calculate the s gravity of liquids in A, B,C and D.

Question 4

A- show the following symbols on the figure (v, h

enter of pressure experiment and in the partial immersion part, the followi
rawn in the experiment report. From this chart find L and a - if $d=10$ cm
ı.



Q3

$$S.g = \frac{S_{fluid}}{S_{water}} = \frac{L_{water}}{L_{fluid}}$$

$$S.g(A) = \frac{75}{75} = 1.0 \quad (1/2) \quad A \text{ is water}$$

(A) $S.g(B) = \frac{L_w}{L_B} = \frac{75}{100} = 0.75$ (1)

$S.g(C) = 75/50 = 1.50$ (1)

(B) $S.g(A) = 1$

$S.g(B) = 6/9 = 0.666$

$S.g(C) = \frac{6}{4.5} = 1.33$

(C) $S.g(A) = 1$

$S.g(B) = 9/12 = 0.75$

$S.g(C) = 9/6 = 1.5$

(5)

fluid D has the lowest specific gravity.

We have to use onther container with high depth.

Al-Balqa' Applied University

Faculty of Engineering Technology

ourse: Fluid mechanics lab. **Midterm- Exam** **Time: One- Hou**

uestion 1

A-The following data was recorded in viscosity experiment

No.	Time sec	X mm
1	1.92	600
2	2.37	750

If : r = 1mm, density of the ball =7800kg/m^3 , density of the glycerin 1370 kg/m^3

Find the average kinematic viscosity of the glycerin

Question 2

A- The following data was recorded in venturi experiment

No.	T (s)	H_1 (mm H_2O)	H_2 (mm H_2O)	V (mL)
	22.05	307	107	3500

If D_1=2cm and D_2=1cm ,determine the venturi coefficient.

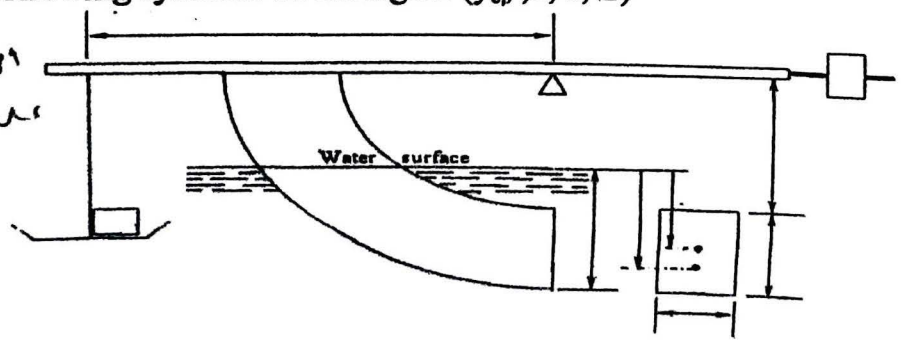
B- Explain how to correct the bourdon gauge reading

Question 3

If there are four same containers filled with four different liquids. Container A, which is filled with water, the hydrometer immersed length was 6 cm. In container B the hydrometer immersed length was 9 cm, while in container C the immersed length was 4.5cm. while in container D the hydrometer set at the bottom. Calculate the specific gravity of liquids in A, B,C and D.

Question 4

A- show the following symbols on the figure (y_{cp} ,d, a, L)



Al-Balqa' Applied University

A

Faculty of Engineering Technology

Course: Fluid mechanics lab. **Midterm- Exam** **Time: One- Hour**

Question 1

The following data was recorded in viscosity experiment

No.	Time sec	X cm
1	2.56	80
2	1.75	70

If r =1mm,density of the ball =7800kg/m^3 , density of the glycerin 1370 kg/m^3
Find the average kinematic viscosity of the glycerin

Question 2

A- The following data was recorded in venturi experiment

No.	T (s)	H_1 (mm H_2O)	H_2 (mm H_2O)	V (mL)
	20.5	337	219	2500

Calculate the venturi coefficient if D_1=2cm and D_2=1cm .

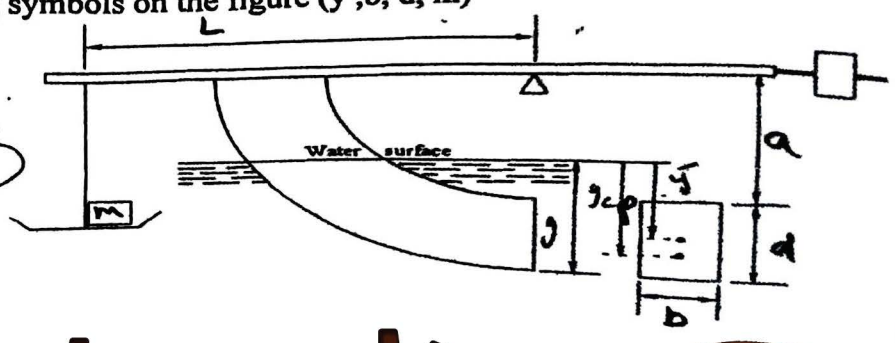
B- Explain how to correct the bourdon gauge reading

Question 3

If there are four same containers filled with four different liquids. Container A, which is filled with water, the hydrometer immersed length was 75mm. In container B the hydrometer immersed length was 100 mm, while in container C the immersed length was 50m. while in container D the hydrometer set at the bottom. Calculate the specific gravity of liquids in A, B,C and D.

Question 4

A- A- show the following symbols on the figure (y ,b, d, m)



2

Q 2 (A)

$$Q_{actual} = \frac{V}{t} = \frac{0.0025}{20.5} = 1.219 \times 10^{-4}\ m^3/s$$ (1)

$$A_1 = \frac{\pi}{4} d_1^2 = 3.141 \times 10^{-4}\ m^2$$

$$A_2 = \frac{\pi}{4} (d_2)^2 = 7.854 \times 10^{-5}\ m^2 \qquad (A_2/A_1) = \frac{1}{4}$$

(A) (1)

$$Q_{th} = A_2 \sqrt{\frac{2g(h_1 - h_2)}{1 - \left(\frac{A_2}{A_1}\right)^2}} = \sqrt{\frac{2 \times 9.81 [0.337 - 0.219]}{1 - (0.25)^2}} \times$$

$$= 1.234 \times 10^{-4}\ m^3/s$$ (1)

$$C = \frac{Q_{act}}{Q_{th}} = \frac{1.219 \times 10^{-4}}{1.234 \times 10^{-4}} = 0.9876$$ (1)

(B)

$$Q_{act} = \frac{0.0035}{22.05} = 1.5873 \times 10^{-4}\ m^3/s$$

$$Q_{th} = 1.606 \times 10^{-4}\ m^3/s$$

$$C = 0.987$$

(C)

$$Q_{act} = \frac{0.0045}{36.9} = 1.2195 \times 10^{-4}\ m^3/s$$

$$Q_{th} = 1.234 \times 10^{-4}\ m^3/s$$

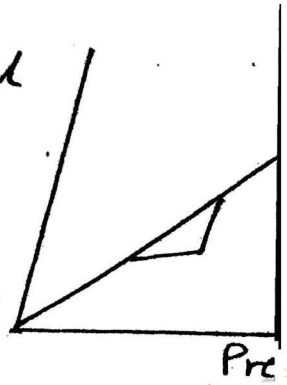
$$C = 0.9876$$

Q2/B

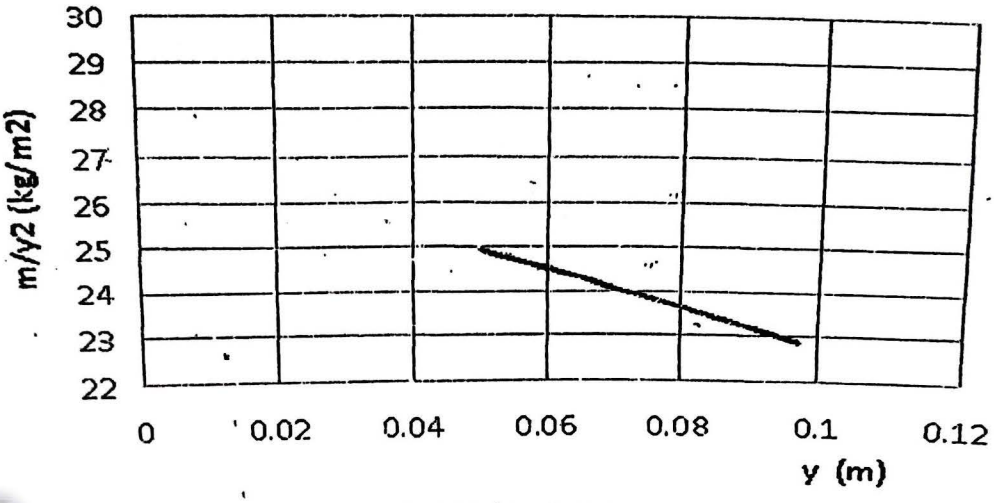
$$P_{cal} = C * P_{reading}$$

C = slope = correction factor.

(2)



of pressure experiment and in the partial immersion part, the following chart in the experiment report. From this chart find L and a - if $d=10\ cm$ and $b=$



Q3 $S.g = \frac{S_{fluid}}{S_{water}} = \frac{L_{water}}{L_{fluid}}$

$S.g(A) = \frac{75}{75} = 1.0$ (½) A is water

D $S.g(B) = \frac{L_w}{L_B} = \frac{75}{100} = 0.75$ (½)

$S.g(C) = 75/50 = 1.50$ (½)

B $S.g(A) = 1$

$S.g(B) = 6/9 = 0.666$

$S.g(C) = \frac{6}{4.5} = 1.33$

C $S.g(A) = 1$

$S.g(B) = 9/12 = 0.75$

$S.g(C) = 9/6 = 1.5$

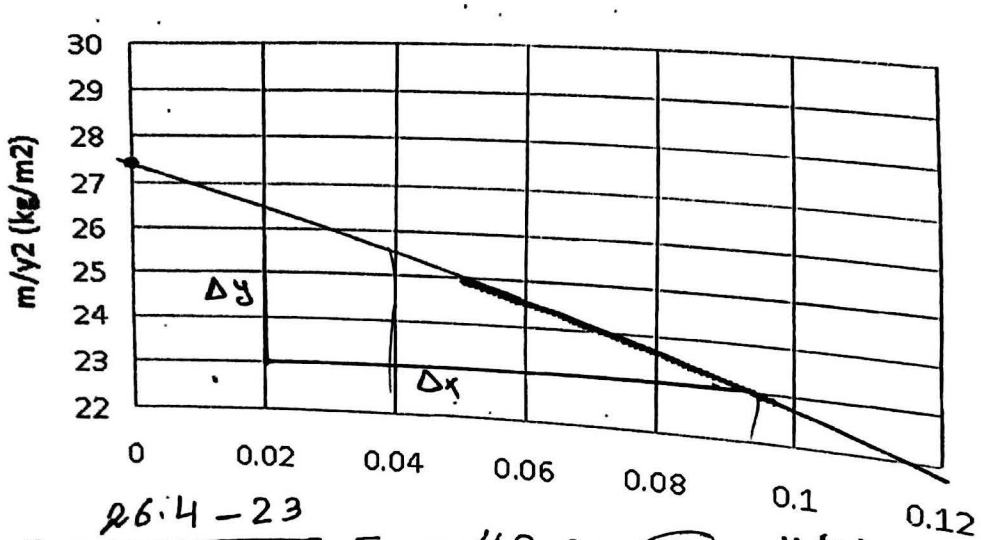
fluid D has the lowest specific gravity. (1.5)

We have to use onther container with high depth.

In center of pressure experiment and in the partial immersion part, the following chart is drawn in the experiment report. From this chart find L and a - if $d=10$ cm and $b=5$cm.

$\left.\frac{m}{y^2}\right| = 27.4$

$y=0.0$ (1)



$$slope = \frac{\Delta y}{\Delta x} = \frac{26.4-23}{0.02-0.094} = -43.24$$ (1)

For partial immersion

$$\frac{m}{y^2} = \frac{1}{2}\frac{\rho b}{L}\left[a+d-\frac{y}{3}\right]$$

$$\Rightarrow slope = -\frac{\rho b}{6L} = -43.24 = \frac{-1000*0.075}{6*L}$$

$$\Rightarrow L = \frac{75}{6*43.24} = 0.289\ m$$ (1)

at $y=0$

$$\frac{m}{y^2} = 27.4 = \frac{\rho b}{2L}[a+d] = \frac{1000*0.075[a+0.1]}{2*0.289}$$

$$\Rightarrow a = 0.111\ m$$ (1)