جامعة فيلادلفيا Philadelphia University	**اسم النموذج :** الامتحان	**رمز النموذج :**	QFO-AP-VA-009
	الجهة المصدرة: نائب الرئيس للشؤون الأكاديمية	**رقم الإصدار: (Rev)**	2
	الجهة المدققة : اللجنة العليا لضمان الجودة	**تاريخ الإصدار:**	2025-4-14
		عدد الصفحات:	1

إقرار المشاركة في الامتحان:

أنا الطالب المذكور أدناه، أقر وأوافق على الشروط الآتية قبل المشاركة في الامتحان:

- إغلاق جميع الأجهزة الإلكترونية مثل الهواتف الذكية، الساعات الذكية، الأجهزة اللوحية، وأي أجهزة إلكترونية أخرى بشكل كامل، وتسليمها للمراقب.
- إن استخدام أي من الأجهزة الإلكترونية أثناء الامتحان من قبلي يُعتبر انتهاكًا لقوانين الامتحان وسيتم اعتباره محاولة غش.
- أفهم أنه في حال تم العثور على أي جهاز إلكتروني بحوزتي، حتى لو كان مغلقًا، فإن ذلك سيُعتبر محاولة للغش، وسأواجه إجراءات تأديبية وفقًا للتعليمات المعمول بها في الجامعة.

اسم الطالب: _____ التوقيع: _____

Student Name: _____ Student Number: _____

Faculty of Engineering / Dept. of Mechanical Engineering
Mid Exam, Second Semester: 2024/2025

Course Title: Fluid (2)	**Date: 01 /12/2025**
Course No: 0620320	**Time Allowed: 1 hour**
Lecturer: Prof. Munzer Ebaid	**No. of Pages: pages: (4)**
Internal Examiner: Dr. Shatha Ammoura	**Coordinator: None**

Question 1: Basic Notions **(30 Marks)**

Objectives:

- To define density, specific gravity, and specific weight.
- To assess knowledge related to fluid properties, primary dimensions , velocity gradient, and hydrostatic pressure equation

Outcomes:

- Explain the concepts of density, specific gravity, and specific weight, and differentiate between them with correct units.
- Identify and describe key fluid properties and relate them to the primary dimensions used in fluid mechanics.
- Calculate velocity gradients in simple fluid flow situations using appropriate formulas.
- Apply the hydrostatic pressure equation to determine pressure variation with depth in a static fluid

Question 2: Familiar Problems Solving **(35 Marks)**

Objectives:

- To assess students' ability to apply fundamental equation of hydrostatic fluid.
- To assess students' ability to apply manometer equation.

Outcomes:

- Students will be able to **a**pply the manometer equation to determine pressure differences in single-fluid and multi-fluid manometer systems.
- Students will **u**se the fundamental hydrostatic pressure equation to analyze pressure variation in static fluids.

Question 3: Unfamiliar Problems Solving **(35 Marks)**

Objectives:

- To determine the total hydrostatic force acting on a fully submerged circularr gate in water.
- To locate the line of action (center of pressure) of the hydrostatic resultant on the circular gate.

Outcomes:

- Students will be able to Calculate the total hydrostatic force on a fully submerged circular gate.
- Students will be able to Determine the line of action (center of pressure) of the hydrostatic force.

Question:	1	2	3	Total	Total
Points:	30	35	35	100	30
Score:					

All Questions Must Be Answered

QUESTION (1) (30 MARKS)

Choose the correct answer of the following. One answer only

1. The **primary dimensions of work** is

a. $[W] = \left[\frac{L^2}{MT}\right]$

b. $[W] = \left[\frac{ML^2}{T}\right]$

c. $[W] = \left[\frac{ML}{T^2}\right]$

d. $[W] = \left[\frac{ML^2}{T^2}\right]$

2. Air at standard sea level pressure $(101\,kPa)$, has a temperature of $10\,^{\circ}C$, the **specific weight** (γ_{air}) is equal to ($R = 287\,{}^{J}/_{kgK}$)

a. 13.60 kN/m^3
b. 12.20 kN/m^3
c. 14.50 kN/m^3
d. 10.5 kN/m^3

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3. Select which one of the followings applies for **specific gravity** $(S.G)$ of water

a. Can have the units of N/m^3
b. S.G = 1.0
c. Increases with temperature
d. None of the above

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4. The pressure (p) in a static fluid with vertical distance $(z = 10m)$ measured upwards is

a. $dp = -10z$
b. $dp = -10\rho\, dz$
c. $dp = -10\gamma$
d. $dp = -10$

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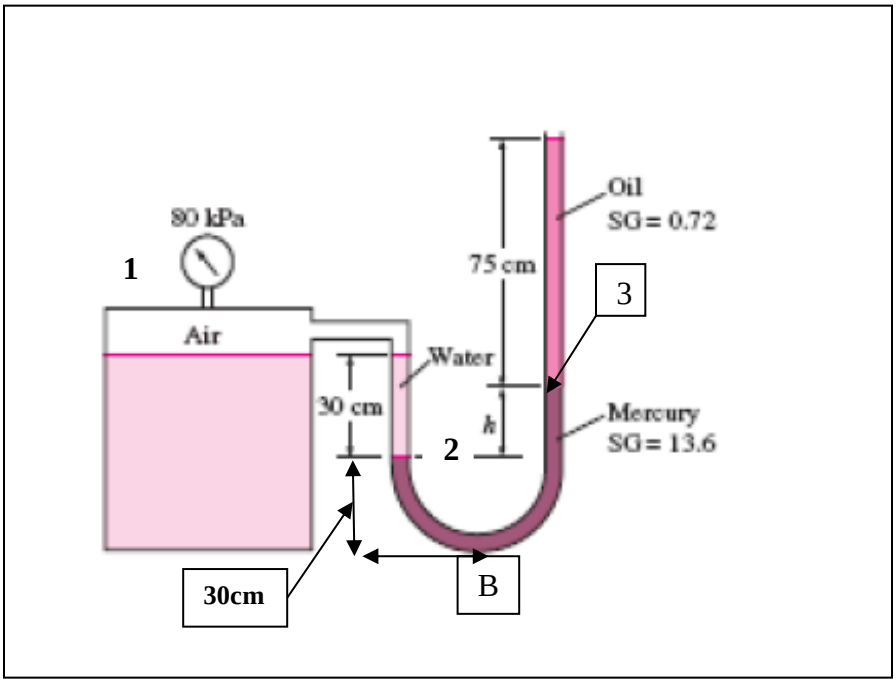
5. For a **flow over a surface, the velocity and velocity gradient are equal to**

a. $V = 0,\ du/dy = 0$
b. $V = 0,\ du/dy \neq 0$
c. $V \neq 0,\ du/dy = 0$
d. None of the above

QUESTION (2) **(35 MARKS)**



Find:

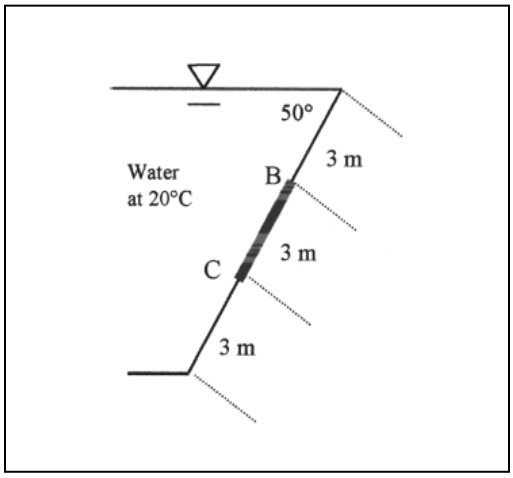
a. Height (h) between points (2) & (3). **(25 marks)**
b. Pressure at point (B). **(10 marks)**

QUESTION (3) **(35 MARKS)**

The gate BC is **circular** and totally immersed in **water** as shown in the Schematic diagram.

Find:

a. The hydrostatic force (F) on the circular gate. **(20 marks)**
b. Hydrostatic force line of action (y_{CP}). **(15 marks)**



Good Luck