
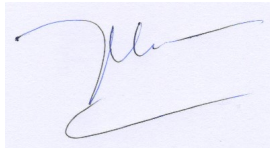


## Midterm Examination

Date: 10 Nov 2021; Duration: 120 minutes

**Open book; Online; Laptops/Cell-phone are allowed.**

<b>SUBJECT: PHYSICS 2 (ID: PH014IU) – CODE: 1</b>	
Approval by Chair of Department of Physics Signature 	Lecturer: Signature 
Full name: Phan Bảo Ngọc	Full name: Phan Hiền Vũ
Proctor 1 Signature	Proctor 2 Signature
Full name:	Full name:
<b>STUDENT INFO</b>	
Student name:	
Student ID:	

**INSTRUCTIONS:** the total of point is 100 (equivalent to 20% of the course)

1. *Purpose:*

- Test your knowledge in CLO1.
- Examine your skill in analysis and design in CLO2 and CLO3.
- Evaluate your English skill in analyzed writing in CLO4.

2. *Requirement:*

- Choose carefully your exam CODE.
- Read carefully each question and answer it following the requirements.
- Write the answers and draw models CLEAN and TIDY directly in the exam paper.
- Take CLEAR photos of your exam paper, and convert them into ONE PDF FILE, named 'YOUR NAME'.PDF.
- Submit your exam FILE in the Blackboard system as an assignment by DEADLINE.

## QUESTIONS

**Q1. (20 marks)** A hollow sphere floats half-submerged in a liquid of density  $900 \text{ kg/m}^3$  and the submerged volume is  $1.39 \text{ cm}^3$ .

- Find the mass of the sphere.
- If the inner radius of the sphere is equal to  $3/4$  of the outer radius, calculate the density of the material of which the sphere is made.
- Compare the density of the sphere's material and the density of the liquid and then explain why the sphere floats.

**Q2. (20 marks)** A water pipe having a 4.5 cm inside diameter carries water into the basement of a house at a speed of 8.4 m/s. If the pipe tapers to 3 cm, rises to the first floor 4.2 m above the input point and then flows out into the atmosphere.

- What volume of water flows into the atmosphere during a 10 min period?
- What is the speed of water flow at the output point?
- What is the water pressure at the input point?

**Q3. (20 marks)** A solid cylinder of radius  $r_1 = 2.5 \text{ cm}$ , length  $h_1 = 5.0 \text{ cm}$ , emissivity 0.85, and temperature  $100^\circ\text{C}$  is suspended in an environment of temperature  $50^\circ\text{C}$ .

- What is the cylinder's net thermal radiation transfer rate  $P_1$ ?
- If the cylinder is stretched until its radius is  $r_2 = 0.5 \text{ cm}$ , its net thermal radiation transfer rate becomes  $P_2$ .

What is the ratio  $P_2 / P_1$ ?

**Q4. (20 marks)** A 500 g hot tea is at a temperature  $100^\circ\text{C}$ . Some ice at  $-10^\circ\text{C}$  is added to cool it. Neglect energy transfers with the environment. The heat of fusion of water is  $333 \text{ kJ/kg}$  and the specific heats of ice and water are  $2220 \text{ J/kg.K}$  and  $4187 \text{ J/kg.K}$ , respectively.

- How much ice should be added to cool it to  $60^\circ\text{C}$ ?
- If a 60 g ice is added, what is the equilibrium temperature?

**Q5. (20 marks)** Fig. 1 displays a closed cycle for a gas. From B to C, 40 J is transferred from the gas as heat. From C to A, 130 J is transferred from the gas as heat, and the magnitude of the work done by the gas is 80 J. From A to B, 400 J is transferred to the gas as heat.

- Supply the plus and minus signs for the given data and explain.
- Compute the work done by the gas from A to B.

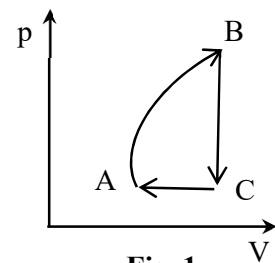



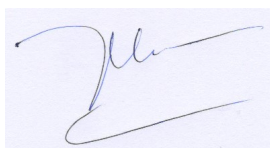
Fig. 1

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## Midterm Examination

Date: 10 Nov 2021; Duration: 120 minutes

**Open book; Online; Laptops/Cell-phone are allowed.**

<b>SUBJECT: PHYSICS 2 (ID: PH014IU) – CODE: 2</b>	
Approval by Chair of Department of Physics Signature 	Lecturer: Signature 
Full name: Phan Bảo Ngọc	Full name: Phan Hiền Vũ
Proctor 1 Signature	Proctor 2 Signature
Full name:	Full name:
<b>STUDENT INFO</b>	
Student name:	
Student ID:	

**INSTRUCTIONS:** the total of point is 100 (equivalent to 20% of the course)

1. *Purpose:*

- Test your knowledge in CLO1.
- Examine your skill in analysis and design in CLO2 and CLO3.
- Evaluate your English skill in analyzed writing in CLO4.

2. *Requirement:*

- Choose carefully your exam CODE.
- Read carefully each question and answer it following the requirements.
- Write the answers and draw models CLEAN and TIDY directly in the exam paper.
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- Submit your exam FILE in the Blackboard system as an assignment by DEADLINE.

## QUESTIONS

**Q1. (20 marks)** A hollow sphere of inner radius 8.5 cm and outer radius 9.5 cm floats half-submerged in a liquid of density  $850 \text{ kg/m}^3$ .

- Compute the mass of the sphere.
- Calculate the density of the material of which the sphere is made.
- Compare the density of the sphere's material and the density of the liquid and then explain why the sphere floats.

**Q2. (20 marks)** A water pipe having a 5 cm inside diameter carries water into the basement of a house. If the pipe tapers to 2.5 cm, rises to the second floor 7.6 m above the input point and then flows out into the atmosphere at a speed of 12.4 m/s.

- What volume of water flows into the atmosphere during a 10 min period?
- What is the speed of water flow at the input point?
- What is the gauge pressure at the input point?

**Q3. (20 marks)** A solid cylinder of radius  $r_1 = 4 \text{ cm}$ , length  $h_1 = 20 \text{ cm}$ , emissivity 0.75, and temperature  $40^\circ\text{C}$  is suspended in an environment of temperature  $50^\circ\text{C}$ .

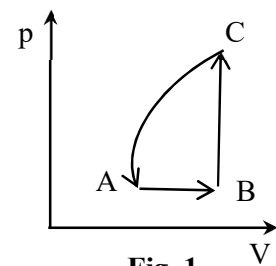
- What is the cylinder's net thermal radiation transfer rate  $P_1$ ?
- If the cylinder is compressed until its radius is  $r_2 = 8 \text{ cm}$ , its net thermal radiation transfer rate becomes  $P_2$ . What is the ratio  $P_2 / P_1$ ?

**Q4. (20 marks)** A 500 g hot tea is at a temperature  $100^\circ\text{C}$ . Some ice at  $-10^\circ\text{C}$  is added to cool it. Neglect energy transfers with the environment. The heat of fusion of water is  $333 \text{ kJ/kg}$  and the specific heats of ice and water are  $2220 \text{ J/kg}\cdot\text{K}$  and  $4187 \text{ J/kg}\cdot\text{K}$ , respectively.

- How much ice should be added to cool it to  $50^\circ\text{C}$ ?
- If a 50 g ice is added, what is the equilibrium temperature?

**Q5. (20 marks)** Fig. 1 displays a closed cycle for a gas. From B to C, 40 J is transferred to the gas as heat. From A to B, 130 J is transferred to the gas as heat, and the magnitude of the work done by the gas is 80 J. From C to A, 400 J is transferred from the gas as heat.

- Supply the plus and minus signs for the given data and explain.
- Compute the work done by the gas from C to A.


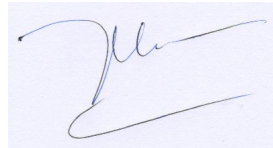


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## Midterm Examination

Date: 10 Nov 2021; Duration: 120 minutes

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<b>SUBJECT: PHYSICS 2 (ID: PH014IU) – CODE: 3</b>	
Approval by Chair of Department of Physics Signature 	Lecturer: Signature 
Full name: Phan Bảo Ngọc	Full name: Phan Hiền Vũ
Proctor 1 Signature	Proctor 2 Signature
Full name:	Full name:
<b>STUDENT INFO</b>	
Student name:	
Student ID:	

**INSTRUCTIONS:** the total of point is 100 (equivalent to 20% of the course)

1. *Purpose:*

- Test your knowledge in CLO1.
- Examine your skill in analysis and design in CLO2 and CLO3.
- Evaluate your English skill in analyzed writing in CLO4.

2. *Requirement:*

- Choose carefully your exam CODE.
- Read carefully each question and answer it following the requirements.
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- Take CLEAR photos of your exam paper, and convert them into ONE PDF FILE, named 'YOUR NAME'.PDF.
- Submit your exam FILE in the Blackboard system as an assignment by DEADLINE.

## QUESTIONS

**Q1. (20 marks)** A hollow sphere of mass 1.22 kg and density  $1300 \text{ kg/m}^3$  floats half-submerged in a liquid of density  $800 \text{ kg/m}^3$ .

- Compute the outer radius of the sphere.
- Compute the inner radius of the sphere.
- Compare the density of the sphere's material and the density of the liquid and then explain why the sphere floats.

**Q2. (20 marks)** A water pipe having a 6 cm inside diameter carries water into the basement of a house with a volume flow rate of  $28.26 \text{ cm}^3/\text{s}$ . If the pipe tapers to 2 cm, rises to the third floor 9.4 m above the input point and then flows out into the atmosphere.

- What volume of water flows into the atmosphere during a 10 min period?
- What is the speed of water flow at the output point?
- What is the water pressure at the input point?

**Q3. (20 marks)** A solid cylinder of radius  $r_1 = 6 \text{ cm}$ , length  $h_1 = 7.5 \text{ cm}$ , emissivity 0.75, and temperature  $50^\circ\text{C}$  is suspended in an environment of temperature  $30^\circ\text{C}$ .

- What is the cylinder's net thermal radiation transfer rate  $P_1$ ?
- If the cylinder is stretched until its radius is  $r_2 = 1.5 \text{ cm}$ , its net thermal radiation transfer rate becomes  $P_2$ .  
What is the ratio  $P_2 / P_1$ ?

**Q4. (20 marks)** A 500 g hot tea is at a temperature  $100^\circ\text{C}$ . Some ice at  $-10^\circ\text{C}$  is added to cool it. Neglect energy transfers with the environment. The heat of fusion of water is  $333 \text{ kJ/kg}$  and the specific heats of ice and water are  $2220 \text{ J/kg.K}$  and  $4187 \text{ J/kg.K}$ , respectively.

- How much ice should be added to cool it to  $40^\circ\text{C}$ ?
- If a 40 g ice is added, what is the equilibrium temperature?

**Q5. (20 marks)** Fig. 1 displays a closed cycle for a gas. From B to C, 40 J is transferred to the gas as heat. From C to A, 130 J is transferred from the gas as heat, and the magnitude of the work done by the gas is 80 J. From A to B, 400 J is transferred to the gas as heat.

- Supply the plus and minus signs for the given data and explain.
- Compute the work done by the gas from A to B.

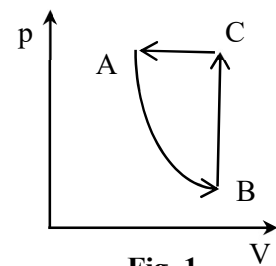


Fig. 1

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