HCMC UNIVERSITY OF TECHNOLOGY AND EDUCATION
Faculty of International Education
Foundation Science group

FINAL EXAMINATION
SEMESTER II – ACADEMIC YEAR 2024-2025
Course name: **Physics 1**
Course ID: PHYS130902E
Exam code: 01   Number of pages: 02
Duration: 90 minutes.

Note:
+ Proctors are not allowed to give any unauthorized explanation.
+ Students are allowed to use one A4 paper sheet as a memory aid.

Question 1: (1.0 marks/10)

An object is launched at some angle to the horizontal with some initial speed v_i, and air resistance is negligible.

  (a) What is its acceleration in the vertical direction?

  (b) What is its acceleration in the horizontal direction?

Question 2: (2.0 marks/10)

The driver brakes the car when he sees a tree blocking the road. The car slows uniformly with an acceleration of -5.6 m/s^2 for 4.2 s, and slides a distance of 62.4 m, all the way to the tree. At what speed does the car strike the tree?

Question 3: (2.0 marks/10)

A 1200-kg car traveling initially at $v_{Ci} = 25.0$ m/s in an easterly direction crashes into the back of a 9000-kg truck moving in the same direction at $v_{Ti} = 20.0$ m/s (see the figure below). The velocity of the car immediately after the inelastic collision is $v_{Cf} = 18.0$ m/s to the east.
 (a) What is the velocity of the truck immediately after the collision?
 (b) What is the change in mechanical energy of the car–truck system in the collision?
 (c) Account for this change in mechanical energy.

Before   After

Question 4: (2.0 marks/10)

Two blocks are connected by a string of negligible mass passing over a pulley of radius r = 0.25 m and of mass M = 5.0 kg as shown in figure on the right. The pulley is a solid disk, free to rotate about the horizontal axis passing through its center. The string does not stretch. The coefficient of kinetic friction between m_1 and the incline is 0.36.

  Determine:

 (a) the acceleration of the object

 (b) the tensions in the string on both sides of the pulley.
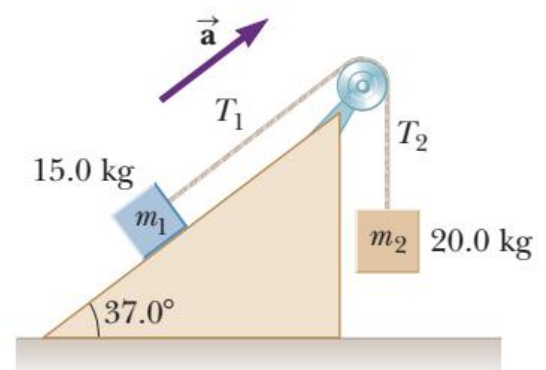
Question 5: (1.0 marks/10)

Common thermometers are made of a mercury column in a glass tube. Based on the operation of these thermometers, which has the larger coefficient of linear expansion, glass or mercury? (Don't answer the question by looking in a table.)

Question 6: (2.0 marks/10)

A 1.00-mol sample of an ideal monatomic gas (having 3 degrees of freedom) is taken through the cycle shown in figure on the right. The process A - B is an isothermal expansion. Calculate:

(a) the net work done by the gas

(b) the energy added to the gas by heat

(c) the energy exhausted from the gas by heat

(d) the efficiency of the cycle.
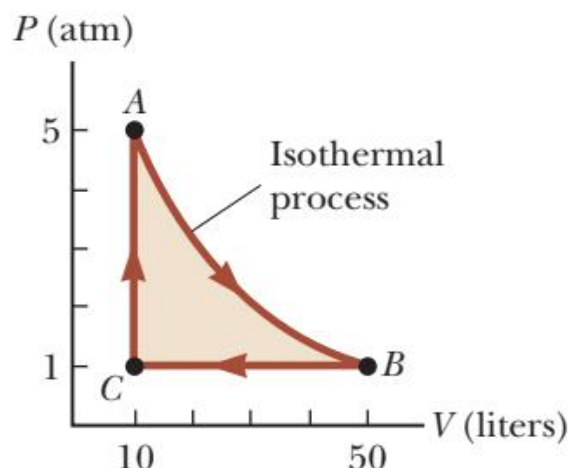
The universal gas constant is R = 8.31 J/mol.K
The magnitude of the free-fall acceleration is g = 9.80 m/s²
1 atm = 101300 Pa

Learning outcome mapping	Assessed in
[ELO 1.1]: Understanding various concepts, theorems, and laws related to classical mechanics and fluid mechanics.	Questions 1
[ELO 2.1]: Applying the knowledge and skills required to solve the problems in mechanics. [ELO 3.1]: To express the learned knowledge by problem solving capability and answer questions related to the concepts learned.	Questions 2, 3, 4
[ELO 2.1]: Applying the principles of thermodynamics to explain the phenomena related to the temperature as well as solving the related problems. [ELO 3.1]: To express the learned knowledge by problem solving capability and answer questions related to the concepts learned.	Questions 5, 6

20th May, 2025
Approved by program chair