PHYS21 Final 06 2021

Physics 2 (Trường Đại học Quốc tế, Đại học Quốc gia Thành phố Hồ Chí Minh)

THE INTERNATIONAL UNIVERSITY (IU) – VIETNAM NATIONAL UNIVERSITY - HCMC

FINAL EXAMINATION – CLASS

Student Name:_____Student ID:_____

Date: JUNE 2021

Duration: 48 hours (8:00 AM 21/06/2021 – 8:00 AM 23/06/2021)

GROUP 1

SUBJECT: **PHYSICS 2**	
Head of Department of Physics: Signature: Full name: Phan Bao Ngoc	Lecturer: Signature:  Full name: Do Xuan Hoi

Question 1 (20 pts) A quantity of heat is added to a gas in a cylinder and the gas is expanded from a volume of 0.110 m^3 to 0.320 m^3 under a constant pressure. A work of 3.78×10^4 J done by the gas and the internal energy of the gas increases by 7.72×10^4 J.

a/ Find the pressure of the gas.

b/ Compute the quantity of heat added to the gas. Is this gas ideal or not?

Question 2 (20 pts) After an adiabatic process of compression of an ideal gas made by a piston in a cylinder of 240 cm^3, the temperature, the pressure and the volume of the gas are 328°C, 1.23×10^6 N/m^2 and 40 cm^3 respectively. Suppose $\gamma = 1.40$.

a/ Compute the temperature and the pressure at the beginning of this process.

b/ Demonstrate the formula to compute the work done by the gas and find the numerical value of the work of the piston in this process. Explain the sign of the result.

Question 3 (20 pts) Knowing that the mean free path of molecules of an ideal gas in a cylinder is 0,1 μm and the mean time between collisions is 4×10^{-10} s when the pressure of the gas is 3×10^5 N/m^2. A quantity of gas is removed from the cylinder so that the pressure of the gas is reduced by half. The temperature and the volume are not changed.

a/ What is the new value of the mean free path and of the speed of the molecules?

b/ Find the new mean free time and explain the result compared with the old value.

Question 4 (20 pts) The translational kinetic energy of each molecule in a balloon of diameter of 50.0 cm is 6.11×10^{-21} J.

a/ What is the temperature inside the balloon?

b/ The total translational kinetic energy of the gas is 1.25×10^4 J. Compute the pressure in the balloon.

Question 5 (20 pts) A cup contains 500 g water initially at a temperature of 100°C. This cup is put in a large room of temperature of 20°C.

a/ What will be the temperature of the water if the cup stays in the room for a long time? Explain your answer.

b/ Compute the change of entropy of the system water – room, knowing that the heat capacity of water is 4186 J/(kg.K).

END OF QUESTION PAPER