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 2

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 cylinder is filled with a monatomic ideal gas. At first, the volume, the pressure and the temperature of the gas are 2L, 10^5 Pa and 300^{o}K respectively. Three successive processes are made by this gas:

a $\rightarrow$ b: The volume of the gas decreases to 1 L adiabatically.

b $\rightarrow$ c: The gas is cooled back down to 300^{o}K at constant volume of 1 L.

c $\rightarrow$ a: The gas expands to 2 L under the constant temperature of 300^{o}K.

a/ Sketch in a single pV diagram these three processes.

b/ Compute the temperature of the gas at the end of the process a $\rightarrow$ b.

c/ Compute the work made by the gas in each process and the total heat transferred in this cycle.

Question 2 (20 pts) Knowing that the molar mass of H_2 is 2.016 g/mol and the molar mass of N_2 is 28.014 g/mol).

At what temperature is the root-mean-square speed of hydrogen molecules equal to the root-mean-square nitrogen molecules speed of at 27^{o}C? Explain the result.

Q**uestion 3 (20 pts)** When1.75 moles of an ideal gas receives 970 J as heat, its temperature rises from 10.0°C to 25.0°C at constant pressure and its internal energy increases by 747 J.

a/ Calculate the work done by this gas.

b/ Compute the ratio of heat capacities $\gamma = \frac{C_P}{C_V}$ of the gas.

Question 4 (20 pts) The translational kinetic energy of a molecule of a gas is 6.21×10^{-21} J and its root-mean-square speed of this molecule is 484 m/s.

a/ Compute the corresponding temperature of this gas.

b/ What is the mass of each molecule? Deduce the nature of this molecule.

Question 5 (20 pts) One kilogram of water at 0°C is brought into contact with a large heat reservoir at 100°C. The specific heat of water is 4180 J/kg.K.

a/ When the water has reached 100°C, what has been the change in entropy of the water and of the entire system consisting of both water and the heat reservoir?

b/ If the water had been heated from 0°C to 100°C by first bringing it into contact with a reservoir at 50°C and then another reservoir at 100°C, what would be the change in entropy of the entire system?

c/ From the result in b/, deduce the method to heat the water from 0°C to 100°C with negligible change in entropy of the entire system.

END OF QUESTION PAPER