Practice Question Set For A-Level
Subject : Physics
Paper-2 Topic: Thermal Physics

Name of the Student:_____
Max. Marks : 25 Marks **Time : 25 Minutes**

Q1.

(a) Write down **four** assumptions about the properties and behaviour of gas molecules which are used in the kinetic theory to derive an expression for the pressure of an ideal gas.

Assumption 1 _____

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Assumption 2 _____

_____

Assumption 3 _____

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Assumption 4 _____

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(4)

(b) (i) A cylinder, fitted with a pressure gauge, contains an ideal gas and is stored in a cold room. When the cylinder is moved to a warmer room the pressure of the gas is seen to increase. Explain **in terms of the kinetic theory** why this increase in pressure is expected.

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(ii) After a time, the pressure of the gas stops rising and remains steady at its new value. The air temperature in the warmer room is 27°C. Calculate the mean kinetic energy of a gas molecule in the cylinder.

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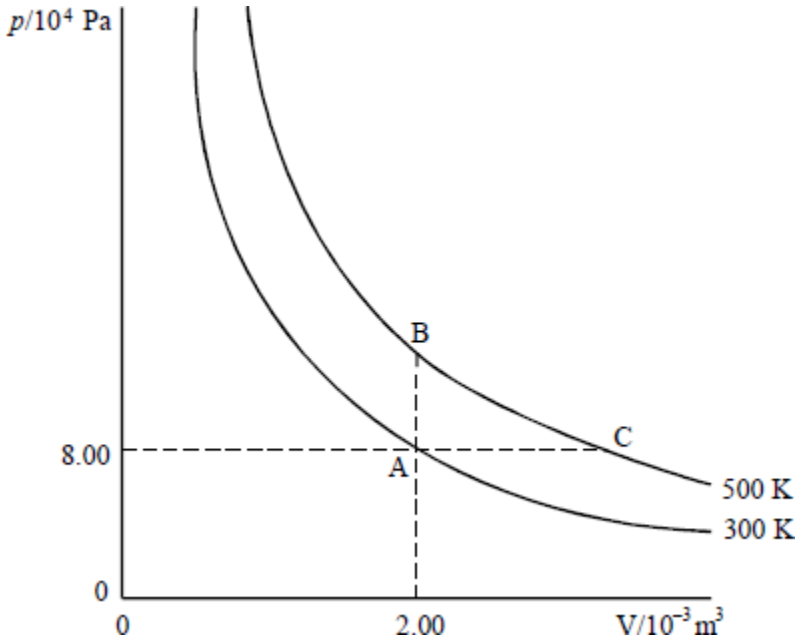
(6)

(Total 10 marks)

Q2.

(a) The diagram shows curves (not to scale) relating pressure p, and volume, V, for a fixed mass of an ideal monatomic gas at 300K and 500K. The gas is in a container which is closed by a piston which can move with negligible friction.

molar gas constant, R, = 8.31 J mol^{-1} K^{-1}



(i) Show that the number of moles of gas in the container is 6.4 × 10^{-2}.

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(ii) Calculate the volume of the gas at point C on the graph.

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(3)

(b) (i) Give an expression for the total kinetic energy of the molecules in one mole of an ideal gas at kelvin temperature T.

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(ii) Calculate the total kinetic energy of the molecules of the gas in the container at point A on the graph.

Explain why this equals the total internal energy for an ideal gas.

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(4)

(c) Defining the terms used, explain how the first law of thermodynamics, $\Delta Q = \Delta U + \Delta W$, applies to the changes on the graph

(i) at constant volume from A to B,

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_____

(ii) at constant pressure from A to C.

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(5)

(d) Calculate the heat energy absorbed by the gas in the change

(i) from A to B,

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(ii) from A to C

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(3)
(Total 15 marks)