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

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Name of the Student:_____
Max. Marks : 24 Marks **Time : 24 Minutes**

Q1.

(a) The air in a room of volume 27.0 m^3 is at a temperature of 22 °C and a pressure of 105 kPa.

Calculate

(i) the temperature, in K, of the air,

_____

(ii) the number of moles of air in the room,

_____

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_____

(iii) the number of gas molecules in the room.

_____

_____

(5)

(b) The temperature of an ideal gas in a sealed container falls. State, with a reason, what happens to the

(i) mean square speed of the gas molecules,

_____

_____

_____

(ii) pressure of the gas.

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(4)

(Total 9 marks)

Q2.

A bicycle and its rider have a total mass of 95 kg. The bicycle is travelling along a horizontal road at a constant speed of 8.0 m s^{-1}.

(a) Calculate the kinetic energy of the bicycle and rider.

_____

_____

(2)

(b) The brakes are applied until the bicycle and rider come to rest. During braking, 60% of the kinetic energy of the bicycle and rider is converted to thermal energy in the brake blocks. The brake blocks have a total mass of 0.12 kg and the material from which they are made has a specific heat capacity of 1200 J kg^{-1} K^{-1}.

(i) Calculate the maximum rise in temperature of the brake blocks.

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(ii) State an assumption you have made in part (b)(i).

_____

_____

(4)

(Total 6 marks)

Q3.

(a) A 3.0 kW electric kettle heats 2.4 kg of water from 16°C to 100°C in 320 seconds.

(i) Calculate the electrical energy supplied to the kettle.

_____

_____

(ii) Calculate the heat energy supplied to the water.
specific heat capacity of water = 4200 J kg^{-1} K^{-1}

_____

_____

_____

(iii) Give **one** reason why not all the electrical energy supplied to the kettle is transferred to

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the water.

_____

_____

(4)

(b) The potential difference supplied to the kettle in part (a) is 230 V.

(i) Calculate the resistance of the heating element of the kettle.

_____

_____

_____

(ii) The heating element consists of an insulated conductor of length 0.25 m and diameter 0.65 mm. Calculate the resistivity of the conductor.

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_____

_____

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_____

(5)

(Total 9 marks)

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