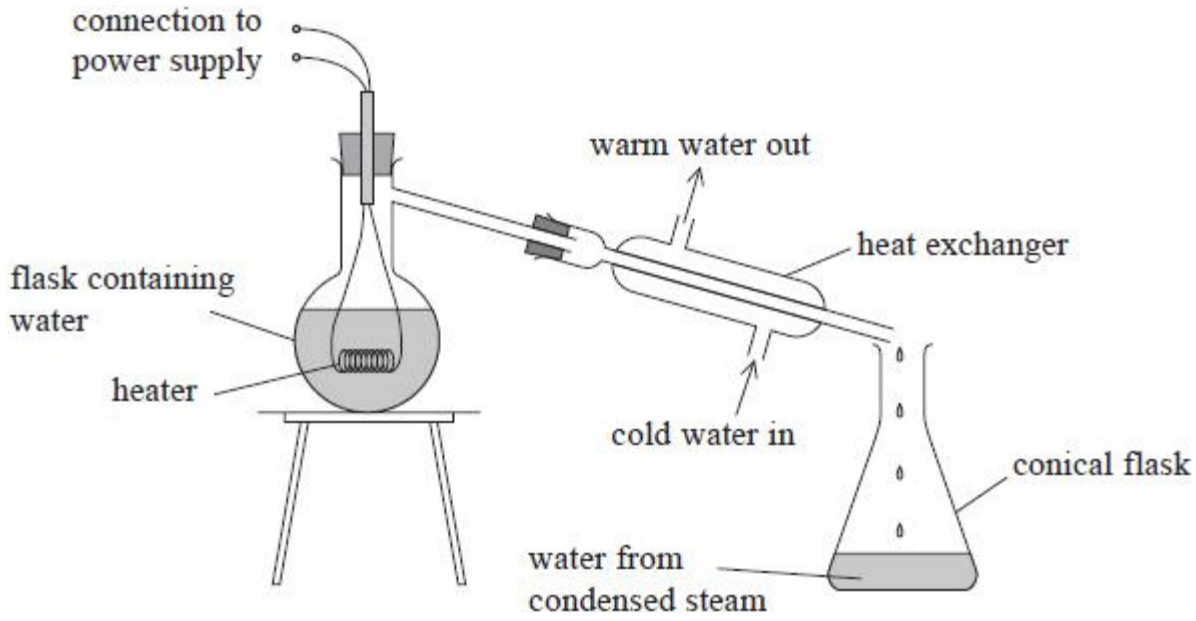
Practice Question Set For A-Level
Subject : Physics
Paper-2 Topic : 9_Thermodynamics

Name of the Student:_____
Max. Marks : 18 Marks **Time : 18 Minutes**

Q1.

The apparatus shown can be used to determine a value for the specific latent heat of vaporisation of water.



(a) In one experiment the current in the heater was 8.20 A, and the potential difference across the heater was 230 V.

(i) Show that the power of the heater was about 2 kW.

(2)

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(ii) There was 0.655 kg of water in the flask at an initial temperature of 22.5 °C.
The heater was switched on, and the water in the flask was heated to boiling point.

Calculate the minimum time taken for the water to be heated to 100.0 °C.
specific heat capacity of water = 4190 J kg^{-1} K^{-1}

(3)

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Minimum time taken for water to be heated = ...

(b) The heater was left on and water continued to boil in the flask. The water was allowed to boil for a few

minutes. The conical flask was then placed under the heat exchanger and water was collected in it.

(i) Give a reason why the water was left boiling for a few minutes before the conical flask was put in place.

(1)

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(ii) Water with a mass of 95.0 g was collected in a time of 125 s.
Calculate the rate of energy transfer in the heat exchanger.
specific latent heat of vaporisation of water = 2.26×10^6 J kg^{-1}

(3)

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Rate of energy transfer in the heat exchanger = ...

(iii) Discuss your answers to (a)(i) and (b)(ii).

(3)

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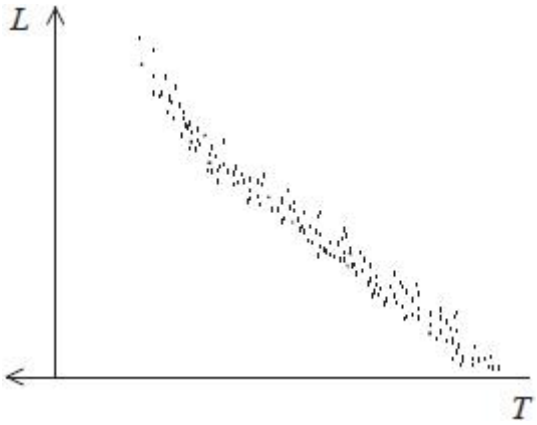
(Total for question = 12 marks)

Q2.

A Hertzsprung-Russell (HR) diagram shows how the luminosity *L* depends on the surface temperature *T* for a group of stars.

The HR diagram below is for a young star cluster.



(i) Explain how we can tell that the young star cluster is in the early stages of its evolution.

(2)

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(ii) Explain why the most massive stars in the cluster have the greatest luminosities.

(4)

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(Total for question = 6 marks)