

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

Name of the Student: _____

Max. Marks : 19 Marks

Time : 19 Minutes

Q1.

The photograph shows a filament bulb.



The filament is an emitter with 35% of the power output of a black body radiator of the same temperature.

In an experiment to investigate the efficiency of a filament light bulb a p.d. was applied. The p.d. and current were measured and the light bulb was observed. The p.d. was then increased and new measurements taken.

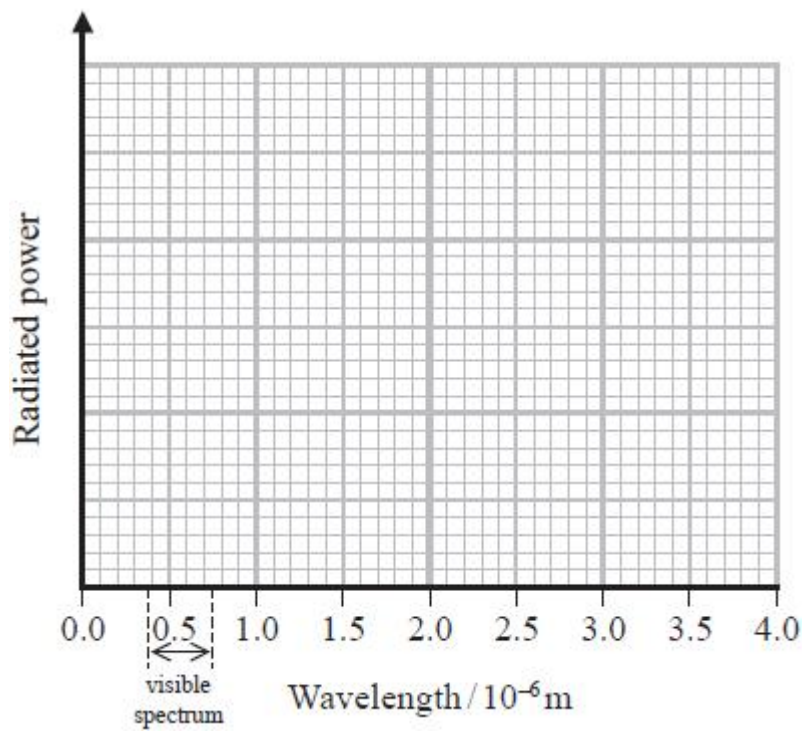
When a small p.d. is applied to the bulb, no light is visible. If the p.d. is gradually increased, the filament starts to glow and eventually appears white.

(i) Add to the graph to show the distribution of radiation from a black body at a temperature of 2026 K.

Your answer should include a calculation.

(5)

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(ii) Use your graph to explain why filament light bulbs are considered inefficient.

(2)

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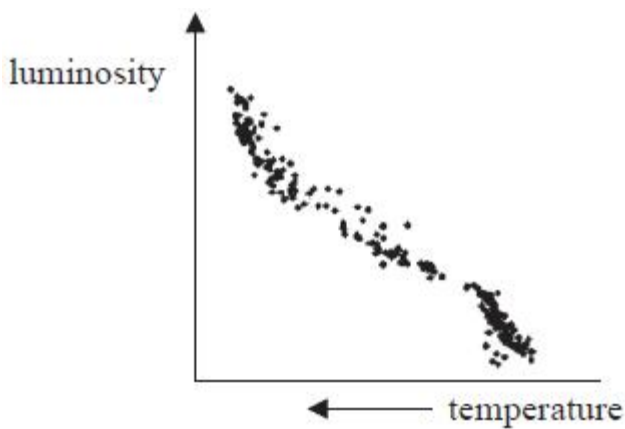
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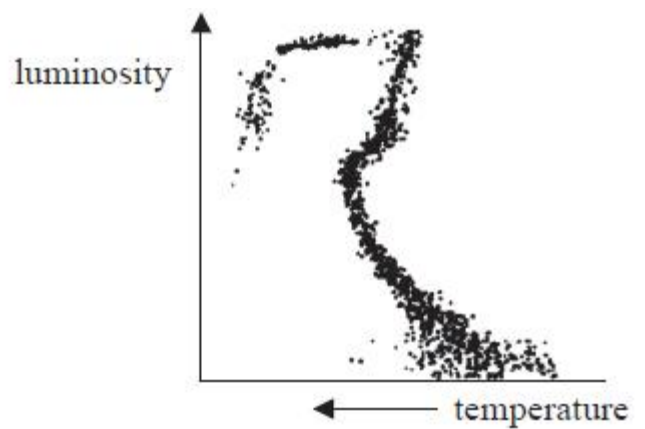
(Total for question = 7 marks)

Q2.

(a) The Hertzsprung-Russell (H-R) diagram is one of the most important tools in the study of stellar evolution. The H-R diagrams below are for a young star cluster and an old star cluster.



Young star cluster



Old star cluster

Use the diagrams to describe and explain how the old star cluster is different from the young star cluster. (6)

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(b) Trigonometric parallax is one way in which stellar distances can be measured.

Astronomers measure the parallax angle for two nearby stars. The parallax angle for star A is 3.74×10^{-6} rad and that for star B is 1.84×10^{-7} rad.

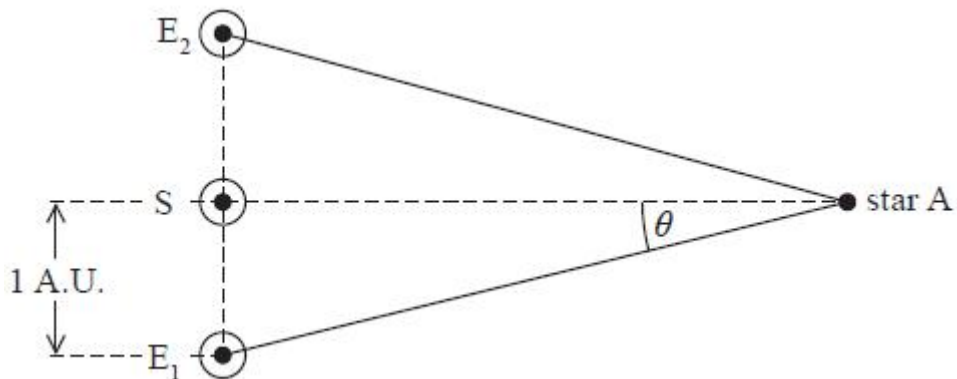
(i) Without calculation, state what can be deduced from this data about the relative distances of the two stars. (1)

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(ii) The diagram shows the parallax angle for star A.
Calculate the distance of star A from the Earth.
1 A.U. is 1.50×10^{11} m

(2)



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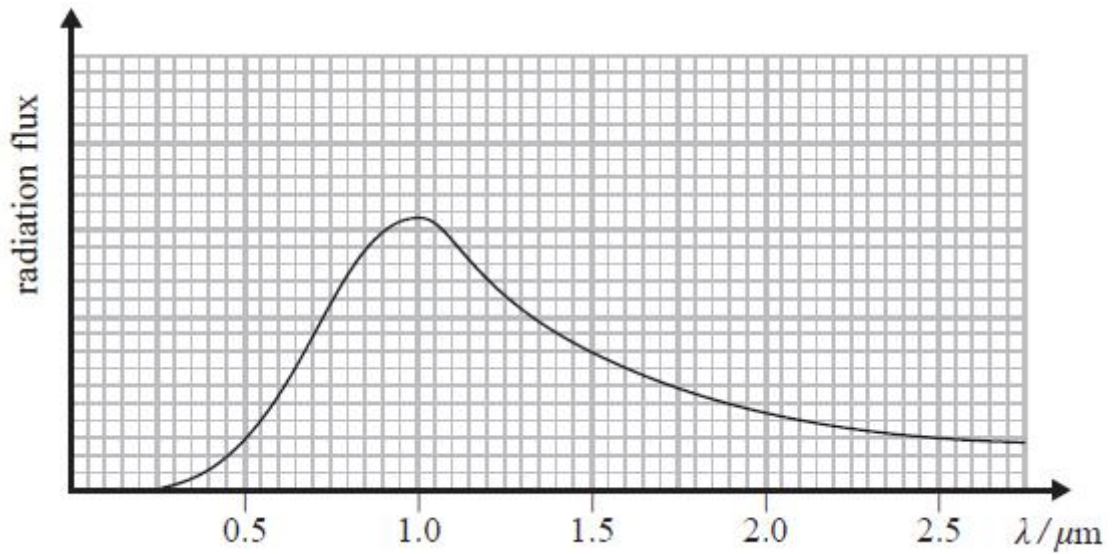
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Distance =

(c) In addition to finding the distances to stars astronomers are interested in determining the temperatures of stars.

The spectrum of star A is shown below.



Use data from the graph to determine the surface temperature of star A.

(3)

Temperature =

(Total for question = 12 marks)