

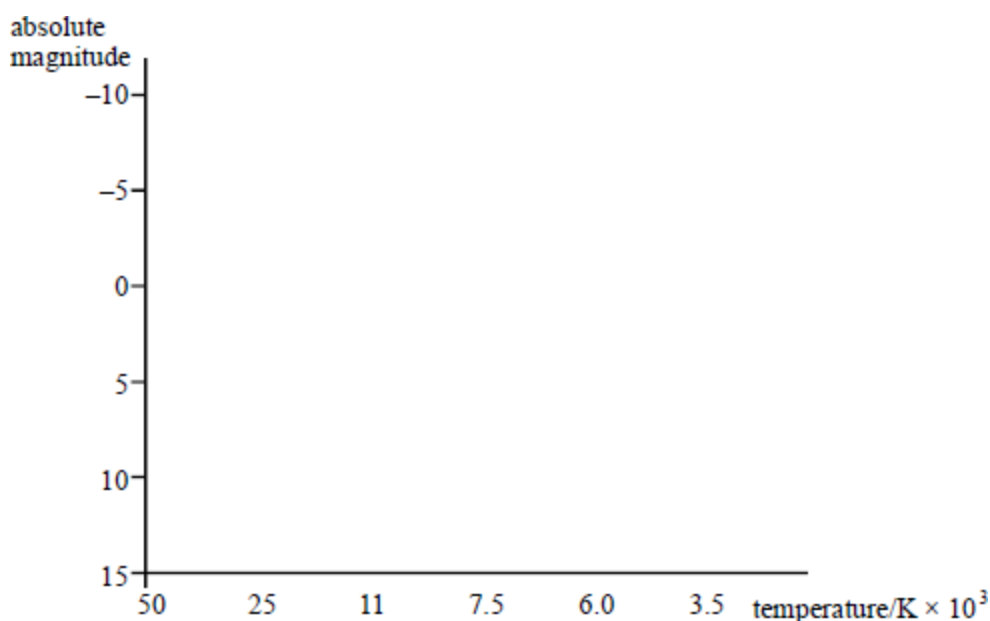
Name of the Student: _____

Max. Marks : 19 Marks

Time : 19 Minutes

Q1.

- (a) Sketch a Hertzsprung-Russell diagram using the axes below. Label the approximate positions of main sequence stars, Red Giant stars, White Dwarf stars and the Sun.



(3)

- (b) The evolution of a star from the main sequence depends on its mass. A certain star in the main sequence, in a position close to the Sun, evolves into a Red Giant.

- (i) Compare the brightness of this star when it is a Red Giant to when it was in the main sequence.

- (ii) Given that the hydrogen in this star undergoes fusion, suggest a sequence of events which causes this star to evolve into a Red Giant.

(4)

- (c) Nova Muscae is believed to be a black hole with a mass approximately three times that of the Sun.

(i) What property of this star causes it to be a black hole? Explain why it is so named.

(ii) State what is meant by the term *event horizon* and calculate the radius of the event horizon for this star, using data from the Data booklet.

(5)

(Total 12 marks)

Q2.

- (a) State **two** similarities between a radio telescope and an optical reflecting telescope.

(2)

- (b) The dish of a radio telescope has holes of diameter 20 mm spaced close together in its reflecting surface in order to reduce the weight of the dish. Explain why the performance of this telescope will be far more satisfactory when receiving signals of frequency 7.5×10^8 Hz than when receiving signals of frequency 1.5×10^{10} Hz.

(3)

- (c) Explain why the resolving power of a single dish radio telescope is normally much less than that of a normal optical telescope.

(2)

(Total 7 marks)