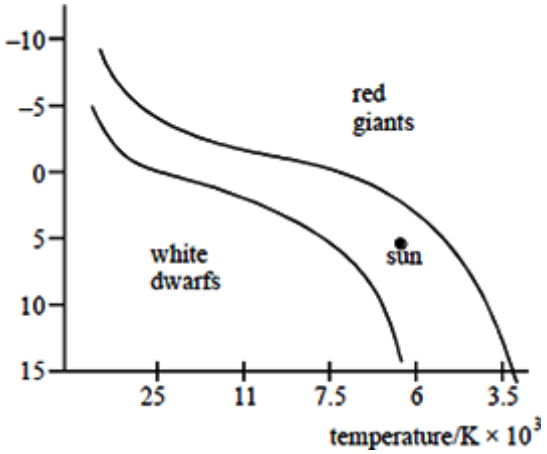
Name of the Student:_____
Max. Marks : 19 Marks **Time : 19 Minutes**

Mark Schemes

Q1.

(a)



correct position of main sequence **(1)**

correct position of White Dwarfs and Red Giants **(1)**

correct position of Sun labelled **(1)**

(3)

(b) (i) brightness when Red Giant > brightness when in main sequence **(1)**

(ii) hydrogen exhausts itself **(1)**

core collapses causing temperature to increase **(1)**

outer part of star expands **(1)**

causes decrease in temperature **(1)**

causing star to appear red **(1)**

(max 4)

(c) (i) very large gravitational field **(1)**

prevents light escaping **(1)**

(ii) event horizon is boundary or surface at which escape speed = c **(1)**

radius $\left(=\frac{2GM}{c^2}\right) = \frac{2 \times 6.67 \times 10^{-11} \times (3 \times 2 \times 10^{30})}{9 \times 10^{16}}$ **(1)**

= 8.9×10^3 m **(1)**

(5)

[12]

Q2.

(a) curved dish (to collect radiation) (*)
reflected to a focus / image or receiver (*)
collect electromagnetic radiation (*)
(*) any two **(1) (1)**

2

(b) $\left(\lambda = \frac{c}{f} \text{ gives}\right) \lambda_1 = \frac{3 \times 10^8}{7.5 \times 10^8}$ =0.4 m and $\lambda_2 = \frac{3 \times 10^8}{1.5 \times 10^{10}}$ = 0.02m **(1)**

$\lambda 2 \approx$ dimensions of holes and signal reduced **(1)**
lower frequency gives $\lambda >$ dimensions of holes, signal not affected **(1)**

3

(c) $\lambda_{rad} >> \lambda_{op}$ **(1)**

explanation (e.g. use of $\theta = \frac{\lambda}{d}$) of $(\text{res. power})_{radio} < (\text{res. power})_{opt}$ **(1)**

2

[7]