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Exam Preparation and Free Resources

Name of the Student:_____

Max. Marks : 19 Marks

Time : 19 Minutes

Mark Schemes

Q1.

(a) (use of $\dfrac{\Delta\lambda}{\lambda} = -\dfrac{v}{c}$ gives) $\dfrac{(660.86 - 656.28)}{656.28} = (-)\dfrac{v}{3.0\times10^8}$ **(1)**

$v = (-)2094$ km s^{-1} **(1)**

2

(b) graph to show:
correct plotting of points **(1)**
straight line through origin **(1)**

$H = \dfrac{v}{d}$ = gradient = 70 km s^{-1} Mpc^{-1} **(1)**

(must show evidence of use of graph in calculation)

3

[5]

Q2.

(a) three parallel rays refracting through objective **(1)**
rays pass through intermediate image at point labelled F_o, F_e
with $f_o > f_e$ **(1)**
rays leave eyepiece parallel to construction ray (which need
not be shown) **(1)**

3

(b) (i) separation (= $f_o + f_e$) = 0.10 + 0.50 = 0.60 m **(1)**

(ii) (use of $m = \dfrac{f_o}{f_e}$ gives) $m = \dfrac{0.5}{0.1} = 5$ **(1)**

$\alpha = m\alpha = 5 \times \dfrac{3500}{380000} = 0.046$ rad **(1)**

[or $\alpha = \dfrac{3500}{380000}$

$\alpha' = 5\alpha = 0.046$ rad]

(iii) edges of the image will appear coloured **(1)**

4

[7]

Q3.

  (a)   (i)   P has the lowest peak wavelength (λ_{max}) **(1)**
                  (since) $\lambda_{max}T$ = constant, lowest λ_{max} means highest T **(1)**
                  [or P has highest peak intensity **(1)**
                  intensity is power per unit area, or ref to Stefan's law **(1)**]

        (ii) $\lambda_{max} = 300 \times 10^{-9}$(m) **(1)**
                (use of $\lambda_{max}T = 0.0029$ gives) $T = 9.7 \times 10^3$K **(1)** (9.67×10^3 K)

                                                                           max 3

  (b)   (i)   A and B **(1)**

        (ii)   light from the star passes through the atmosphere of the star **(1)**
                which contains hydrogen with electrons in $n = 2$ state **(1)**
                electrons in this state absorb certain energies and (hence) frequencies
                of light **(1)**
                the light is re-emitted in all directions, so that the intensity of these
                frequencies is reduced in any given direction,
                resulting in absorption lines **(1)**

                                                                       max 4

                                                                                   [7]