Name of the Student:_____
Max. Marks : 21 Marks **Time : 21 Minutes**

Mark Schemes

Q1.

(a) power (received) proportional to area **(1)**
collecting area proportional to d^2 **(1)**

(2)

(b) energy per unit area at dish = $\frac{7.5 \times 10^{-16}}{\pi(60)^2}$ **(1)**

total energy = $\frac{7.5 \times 10^{-16}}{\pi(60)^2} \times 4\pi(2.5 \times 10^{28})^2$ **(1)**

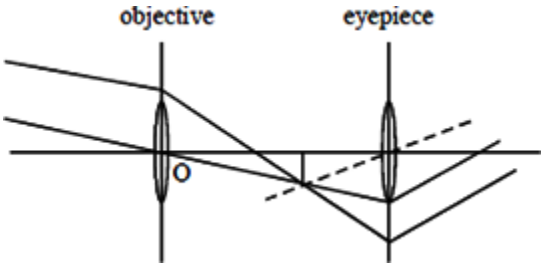
$= 5.2 \times 10^{38}$ W **(1)**

(3)

[5]

Q2.

(a) (i)



correct rays through objective **(1)**

first image at f_0 **(1)**

f_0 and f_e coincide **(1)**

correct construction line(s) **(1)**

rays emerge parallel **(1)**

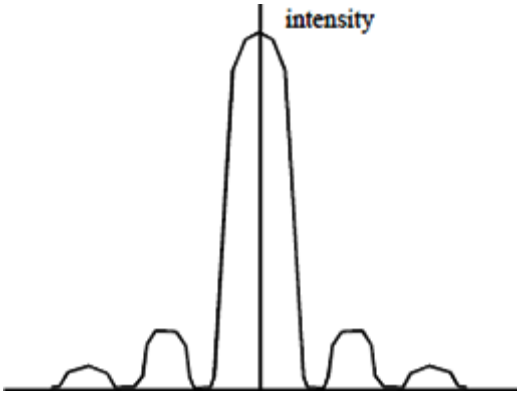
(ii) $\left(M = \frac{\alpha'}{\alpha} \text{ gives}\right) 24 = \frac{120}{\alpha}$ **(1)**

α = 5 sec (of arc) **(1)**

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(7)

(b) (i)



central maximum **(1)**

decreasing maxima **(1)**

approximate equal spacing between

minima either side of central axis **(1)**

(ii) two intensity curves [or two Airy discs] **(1)**
central maximum of first coincides with
first minimum of second curve **(1)**

(5)

(c) (i) $\left(\theta = \frac{\lambda}{d} \text{ gives}\right) \theta = \frac{6.0 \times 10^{-7}}{15 \times 10^{-2}}$ $= 4.0 \times 10^{-6}$ rad **(1)**

angular separation of Mizar 7.0×10^{-5} rad, can be resolved **(1)**

(ii) resolving power controlled by diffraction effects [or by $\frac{\lambda}{d}$] **(1)**

hence increasing angular magnification does not increase resolution **(1)**

(4)

[16]

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