H.W. 3.

6.32) The light gathering power of a telescope is proportional to square of the diameter of its mirror (For Reflective Telescopes).

$$\therefore \frac{L_{keck}}{L_{HST}} = \frac{(D_{keck})^2}{(D_{HST})^2} = \frac{10^2}{2.4^2} = \frac{100}{5.76} = 17.36$$

So keck 1 can gather more light than HST.

Advantages of keck 1 :-

1) Accessible

~~2)~~ But HST has various advantages when it comes to deep sky imaging.

a) No atmospheric interference hence clear/sharp images

b) No scattering hence high spectral Range.

~~3)~~

6.36. The smallest feature that can be seen on the moons of Jupiter can be calculated using the ~~formula~~ formula.

$$D = \frac{\lambda d}{206265}$$

$$\therefore D = \frac{0.1 \times 628 \times 10^3}{206265} \text{ km} = 304.46 \text{ km}.$$

We can Resolve features as small as 304 km on Jupiter's moons using H.S.T.

b) Using the Same logic for Moon.

$$D = \frac{60 \times 3.844 \times 10^{5} \text{ km}}{206265.}$$

$$D = 111 \text{ km}.$$

So a human eye can resolve features as small as 111 km on the moon.

6.48. The aim of Galex is to probe deeper into the universe and make observation in U.V. range. By looking farther, GALEX is obtaining the U.V. signatures of early and young universe.

6.40. a) frequency $f = 557\ GHz$

$$\lambda = \frac{c}{f} = \frac{3\times10^{8}}{557\times10^{9}} = 0.538\times10^{-3} = 0.538\ mm$$

hence the name sub-millimeter.

b) From fig 6.25, it is evident that the atmosphere is opaque to the above wavelength. hence satellites are necessary.

c) $\theta = 2.5\times10^{5} \times \frac{\lambda}{D}$ $\therefore \theta = 240$ arc secs.

$$D = \frac{2.5\times10^{5}\times 0.538\times10^{-3}}{240} = 0.56\ meters.$$

Diameter of mirror is 0.56 meters