## Home Work \# 2

Submitted by: Zeeshan Ahmad
Submitted to: Professor Viviana Vladutescu
EET-3132 Remote Sensing

## Chapter \# 3

1) The first corona was launched on Feb. 28, 1959.
2) August 10,1960 was the first successful launch and recovery of corona capsule. It was mission \# 13.
3) It took 13 launches before a film was successfully returned. Launch \# $14^{\text {th }}$ was the successful one.
4) When Francis Gary Power was shot down in U-2 on May 1, 1960, the president was forced to terminate reconnaissance with Soviet Union.
5) 160 lines/min was the best resolution of KH4 camera which was possible to resolve targets of 6 ft .
6) 9.6 km was the swath width associated with the best-resolution KH-4 images.
7) There were 145 corona missions.
8) 

$f / \#=3.5$, focal length $=24^{\prime \prime}=0.61 \mathrm{~m}$, Diameter $=\frac{\text { focal length }}{f / \#}=\frac{0.61}{3.5}=0.174 \mathrm{~m}$ GSD $=1.22 \frac{\lambda R}{\text { diameter }}=1.22 * \frac{500 * 10^{-9} * 115 * 10^{3}}{0.174}=0.403 \mathrm{~m}$
9) Earth to Geostationary $=35786 \mathrm{~km}, \lambda=500 \mathrm{~nm}, \mathrm{GSD}=0.12 \mathrm{~m}$

$$
\text { GSD }=1.22 \frac{\lambda R}{\text { diameter }} \quad \text { or } \quad \mathrm{D}=1.22 \frac{\lambda R}{G S D}=1.22 * \frac{500 * 10^{-9} * 35786 * 10^{3}}{0.12}=181 \mathrm{~m}
$$

10) The three factors that constrain the resolution obtainable with an imaging system are atmospheric absorption, scattering, and turbulence.
11) The Hubble primary optic has a focal length of 57.4 m , a diameter of 2.4 m , and $\mathrm{f} /$ \# of 24 .
12) $\lambda=850 \mathrm{~nm}, \Delta \theta=1.4544 \mathrm{urad}, 120 \mathrm{nrad} / \mathrm{pixel}$,

So, Pixels for each star $=\frac{1454.4 \mathrm{nrad}}{120 \text { nrad } / \text { pixel }}=12$ pixels

For uncompensated FWHM $=7.5$ urad
So, Pixels $=\frac{7.5 \mathrm{urad}}{120 \mathrm{nrad} / \text { pixel }}=62$ pixels
13) Sol:- Energy band gap for lead sulfide $=0.35$ to $0.40(\mathrm{eV})$ at 300 K Cutoff wavelength $=\lambda=\frac{h * c}{\Delta E}=\frac{1.24 * 10^{-6}(\mathrm{eV} \mathrm{m})}{0.40}=3.1 * 10^{-6} \mathrm{~m}$ or $3.1 \mu \mathrm{~m}$.
14) $f / \#=5.0$, focal length $=24^{\prime \prime}=0.61 \mathrm{~m}$

$$
\text { Diameter }=\frac{\text { focal length }}{f / \#}=\frac{0.61}{5}=12.2 * 10^{-2} \mathrm{~m}=12.2 \mathrm{~cm}
$$

15) Focal length, $f=24$ inch $=0.61 \mathrm{~m}$, Altitude $=115 \mathrm{~km}$, pixel size $=0.01 \mathrm{~mm}$ GSD $=\frac{\text { Pixel size }}{\text { focal length }} *$ Altitude $=\frac{0.01 * 10^{-3} * 115 * 10^{3}}{0.61}=1.885 \mathrm{~m}$
16) $\mathrm{f} / \mathrm{\#}=$ ?, Diameter $=0.57 \mathrm{~mm}=0.57 * 10^{-3} \mathrm{~m}$, focal length $=50 \mathrm{~mm}=5^{*} 10^{-3} \mathrm{~m}$
$f / \#=\frac{\text { focal length }}{\text { Diameter }}=\frac{50 * 10^{-3}}{0.57 * 10^{-3}}=87.7$
17) $G S D=\Delta x=1.22 * \frac{\lambda * R}{\text { diameter }}, \quad 0.66=1.22 \frac{5 * 10^{-7} * 384,400 * 10^{3}}{a}$, diameter $=355.2 \mathrm{~m}$ $\Delta \theta=1.22 \lambda / D=1.22^{*} 5^{*} 10^{-7} \mathrm{~m} / 355.35=1.7 \mathrm{~nm}$
