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Remote Sensing EET 3132

Ch.4 HW

1) $ω=\frac{v}{r}=\frac{2π}{84,164 sec}=7.29 x 10^{-5}Rad/s$

2) If $R\_{Earth}=6.38 x 10^{6} m=Altitude of Earth$, then the period of the circular orbit is:

$$τ=\frac{2π}{R\_{Earth}}\sqrt{\frac{r^{3}}{g\_{o}}}=\frac{2π}{6.38 x 10^{6} m}\sqrt{\frac{(6.38 x 10^{6})^{3} m}{9.8 m/s^{2}}}=5069 seconds$$

3) Period of a Circular orbit @ Earth's surface:

$$τ=\frac{2π}{R\_{Earth}}\sqrt{\frac{r^{3}}{g\_{o}}}=\frac{2π}{6.38 x 10^{6} m}\sqrt{\frac{(5.1 x 10^{14})^{3} m}{9.8 m/s^{2}}}=3.62 x 10^{15} seconds$$

Velocity:

$$v=\sqrt{\frac{g\_{o}}{r}}R\_{Earth}= \sqrt{\frac{9.8 m/s^{2}}{5.10 x10^{14}}}x 6.38 x 10^{6} m=0.88 km/s$$



4)

It obeys Kepler's 3rd law, which states that $τ^{2}∝r^{3}$.

6) No, You cannot see Antarctica from a Geo orbit because the earth's gravity would pull the satellite and eventually crash to the surface.

7) Radius @ Perigee= $R\_{p}=$ 1.5$R\_{Earth}$= 9.57$ x 10^{6} m$

 Radius @ Apogee= $R\_{a}=$ 3$R\_{Earth}$= 19.14 x$ 10^{6} m$

Velocity @ Apogee = 3.73 km/s

Velocity @ Perigee= $v\_{p}=\sqrt{\frac{2GMR\_{a}}{R\_{p}(R\_{a}+R\_{p})}}=\sqrt{\frac{2(3.98 x 10^{14})(19.14 x 10^{6})}{9.57 x 10^{6} (19.14 x 10^{6}+9.57 x 10^{6} )}}=$7.44 km/s