



EEEN 567 – SATELLITE ENGINEERING

ASSIGNMENT 1

Issued on Friday, October 3, 2025. To be handed in on 17th October 2025

Answer All Questions

1. A satellite has a radius of 42,000 Kms from the centre of the earth.
 - (a) Find the velocity and period of the satellite,
 - (b) The change in velocity required if the radius is to be reduced to 36,500 Kms.Assume that the gravitational constant, $g_0 = 398,600.5 \text{ kms}^3/\text{s}^2$.
2. An elliptical satellite has a perigee of 1,100 Kms and apogee of 4,000 Kms. If the radius of the earth is 6370 Kms, determine:
 - (a) the orbital period,
 - (b) eccentricity.
3. (a) Name and describe two methods used to stabilize satellites in orbit.
 - (b) Describe the operation of the following satellite sensors.
 - (i) sun sensor
 - (ii) star sensor
4. The operating frequency of a monostatic pulse radar is 10GHz while its peak power is 500 kW. If the gain of the antenna is 5,000, the effective area of the antenna is 10m^2 , and the radar cross-section is 4m^2 , pulse width is 0.5 microseconds, rest time is 10 microseconds, and the minimum detectable power of the receiver is 10^{-14} , calculate the following:
 - (a) The maximum range of the radar,
 - (b) Duty cycle,
 - (c) Average power.
5. (a) With the aid of a block diagram, describe the operation of a pulse radar system.
 - (b) What are the salient factors governing the choice of the Pulse Repetition Frequency (PRF) of a radar system.
 - (c) Name and discuss the application of RADAR in satellite engineering.