Sheet 1

1- Period of a very low earth orbit (LEO) satellite at height of 200km.

2- Height required for a period of one sidereal day (23 hr. 56 min 4 sec).

3- A satellite is in a 322 km high circular orbit. Determine:
   a. The orbital angular velocity in radians per second;
   b. The orbital period in minutes; and
   c. The orbital velocity in meters per second.

   Note: assume the average radius of the earth is 6,378.137 km and Kepler's
   constant has the value 3.986004418×10^5 km^3/ s^2.

4- A particular shuttle mission released a TDRSS satellite into a circular low orbit, with an
   orbital height of 270 km. The TDRSS satellite needed to be placed into a geostationary
   transfer orbit (GTO) once released from the shuttle cargo bay, with the apogee of
   35,786.03 km and the perigee at the height 270 km. (i)What was the eccentricity of the
   GTO?. (ii)What was the period of the GTO?. Note: assume the

   average radius of the earth is 6,378.137 km and Kepler's constant has the value
   3.986004418×10^5 km^3/ s^2.

5- A satellite is in elliptical orbit with perigee of 1100 km and apogee of 4000 km. Using the
   mean earth radius to be 6378 km , determine the period of the orbit and
   eccentricity of the orbit.

6- A satellite is orbiting in a geosynchronous orbit of radius 42000 km.

   Find the velocity and time period of the orbit , also determine the change in the
   velocity required if the radius of the orbit is to be reduced to 36500 km. Assume
   $\mu = 3.986004418 \times 10^5$ km^3/ s^2 .

7- The orbit of an earth orbiting satellite has an eccentricity of 0.15 and semi major axis of
   9000 km. Determine its periodic time ,the apogee height and perigee height if mean
   value of earth radius is 6371 km.

8- An artificial Earth satellite is in an elliptical orbit which brings it to an altitude of 250 km at perigee and out to an altitude of 500 km at apogee.
Calculate the velocity of the satellite at both perigee and apogee.

9- A satellite orbit has an eccentricity of 0.2 and a semimajor axis of 10,000 km.
Find the values of (*a*) the major axis; (*b*) the minor axis; (*c*) the distance between foci.

10 - The semimajor axis for the orbit of an earth-orbiting satellite is found to be 9500 km.
Determine the mean anomaly 10 min after passage of perigee.

11- Explain what is meant by the ascending and descending nodes. In what units would these be measured, and in general, would you expect them to change with time?