Explain your answers with neat sketches when applicable. Assume all computations are made on Helmert1906 (a = 6378.2 km, $f = \frac{1}{298.3}$). Also, mean radius of the earth is R = 6371 km.

Assignment (4) – Central Cylindrical and Conical Projections

1. Discuss the properties of cylindrical and conical central map projections. How do they preserve or distort certain aspects of the Earth's surface?

2. Describe the shape of graticules (parallels and meridians) in cylindrical and conical central map projections. How do they appear on the map?

3. Express your views about the following statements: -

   a. Meridians are placed at equal distances in cylindrical central projection.
   b. The **scale** along the equator on all the cylindrical projections is **correct.**
   c. Cylindrical projections are best suited for the tropical zone lying between 20°N and 20°S latitudes (equatorial regions).
   d. Conical projections are convenient in intermediate latitudes.

4. Compute the map distance between two cities that share the same longitude $\lambda = 27° 45' E$ whereas $\varphi_A = 29° 30' N$, and $\varphi_B = 25° 20' N$. Also, calculate the length distortion in distance AB. Consider the map has been produced by: -

   a. cylindrical central projection (equator is the center of map)
   b. conical central projection ($\varphi_A = 20° N$ is the center of map)

5. Compute the map distance between two cities that share the same latitude $\varphi = 21° 45' N$ whereas $\lambda_A = 28° 38' E$, and $\lambda_B = 27° 40' E$. Also, calculate the length distortion in distance AB. Consider the map has been produced by: -

   a. cylindrical central projection (equator is the center of map)
   b. conical central projection ($\varphi_A = 20° N$ is the center of map)