Sheet 4

1- The effective aperture of 1.22 m-diameter parabolic reflector antenna is 55% of the physical aperture area.
Compute the gain in dB at 2 GHz , 4 GHz and 8 GHz.

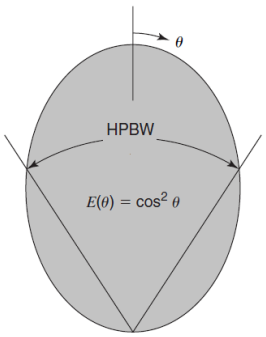
2- For a pyramidal horn antenna with aperture efficiency=0.51 , A=5.54 cm and B= 4.55 cm.
Calculate its gain at 40 GHz.

3- The diameter of a parabolic reflector antenna is 120 cm and its depth is 15 cm.
Calculate the focal length and f/D ratio.

4- Parabolic reflector of diameter 1metre with efficiency of 55% operating at 11 GHz.
Determine the power gain and the half power beamwidth

5- Calculate the power gain (in dB) and the half power beamwidth "HPBW" of a parabolic dish antenna of 30 m in diameter that is radiating at 4 GHz. (assume aperture efficiency =0.6).

6- An antenna has a field pattern given by $E(\vartheta) = cos^2\ \vartheta$ for $0^o \leq \vartheta \leq 90^o$
Find the half-power beamwidth (HPBW).



7- Satellite based transponder output power is 50 watts. Using a parabolic antenna of diameter 1 metre and efficiency of 55%, find the HPBW EIRP footprint on the map of Europe if the down-link carrier frequency used is 12 GHz.

8- A geostationary satellite provides service to a region which can be covered by the beam of an antenna on the satellite with a half power beamwidth of 1.8^o. The satellite carries transponders for Ku band and Ka band, with separate antennas for transmit and receive. For center frequencies of 14.0/11.5 GHz and 30.0/20.0 GHz, determine the diameters of the four antennas on the satellite.