**The University of New Mexico**

**School of Engineering**

**Electrical and Computer Engineering Department**

**ECE 535 Satellite Communications**

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Module # 12: 12.1, 12.3, 12.5, 12.7, 12.9, 12.11, 12.13

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**12.1 Give the decibel equivalents for the following quantities: (a) a power ratio of 30:1; (b) a power of 230 W; (c) a bandwidth of 36 MHz; (d) a frequency ratio of 2 MHz/3 kHz; (e) a temperature of 200 K.**

**(a) Power ratio of 30:1**

**(b) Power of 230W**

**(c) Bandwidth of 36MHz**

**(d) Frequency Ratio of 2MHz/3kHz**

**(e) Temperature of 200K**

**12.3 Calculate the gain of a 3-m parabolic reflector antenna at a frequency of (a) 6GHz; (b) 14GHz.**

**(a) At f = 6Ghz**

**(b) At f = 14Ghz**

**12.5 An antenna has a gain of 46 dB at 12 GHz. Calculate its effective area.**

G = 46dB

c = 299,792,458 m/s

f = 12Ghz

Wavelength (λ) = c/f = 0.0249827m

**12.7 The EIRP from a satellite is 49.4 dBW. Calculate (a) the power density at a ground station for which the range is 40,000 km and (b) the power delivered to a matched load at the ground station receiver if the antenna gain is 50 dB. The downlink frequency is 4 GHz.**

**(a) Power Density at Ground Station 40,000km away**

**(b) Power Delivered to matched load at ground station with ant gain = 50dB, f = 4GHz**

**12.9 Repeat the calculation in Prob. 12.7b allowing for a fading margin of 1.0 dB and receiver feeder losses of 0.5 dB.**

**(b) Power Delivered to matched load at ground station with ant gain = 50dB, f = 4GHz**

**12.11 Two amplifiers are connected in cascade, each having a gain of 10 dB and a noise temperature of 200 K. Calculate (a) the overall gain and (b) the effective noise temperature referred to input.**

G1 = 10dB; G2 = 10dB

T1 = 200K; T2 =200K

**(a) Overall Gain**

**(b) Effective Noise Temp Referred to Input**

**12.13 The noise factor of an amplifier is 7:1. Calculate (a) the noise figure and (b) the equivalent noise temperature.**

(a) Noise Figure

(b) Equivalent Noise Temperature