**The University of New Mexico**

**School of Engineering**

**Electrical and Computer Engineering Department**

**ECE 535 Satellite Communications**

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Module # 9: Problems 12.15, 12.19, 12.21, 12.23, 12.25

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12.15. An amplifier having a noise temperature of 200 K has a 4-dB attenuator connected at its input. Calculate the effective noise temperature referred to the attenuator input.

12.19. Explain what is meant by carrier-to-noise ratio. At the input to a receiver the received carrier power is 400 pW and the system noise temperature is 450 K. Calculate the carrier-to-noise density ratio in dBHz. Given that the bandwidth is 36 MHz, calculate the carrier-to-noise ratio in decibels.

12.21. In a satellite link the propagation loss is 200 dB. Margins and other losses account for another 3 dB. The receiver [G/T] is 11 dB, and the [EIRP] is 45 dBW. Calculate the received [C/N] for a system bandwidth of 36 MHz.

12.23. Explain what is meant by saturation flux density. The power received by a 1.8-m parabolic antenna at 14 GHz is 250 pW. Calculate the power flux density (a) in W/m2 and (b) in dBW/m2 at the antenna.

12.25. A satellite transponder requires a saturation flux density of 110 dBW/m2 , operating at a frequency of 14 GHz. Calculate the earth station [EIRP] required if total losses amount to 200 dB.