Arab Academy For Science, Technology & Maritime Transport.

Course Title: Satellite Communication

Course Code: EC 520



Sheet 2

- 1- At room temperature (T = 290 °K) and 1 MHz bandwidth and get the noise voltage if it is produced by 1 M Ω resistor. Then compare this to a rms 1 μ V signal delivered to a 50 ohm load.
- 2- The noise produced by a resistor is to be amplified by a noiseless amplifier having a voltage gain of 75 and bandwidth of 100 kHz.
 A sensitive meter at the output reads 240µVrms.
 Assuming operation at 27⁰ C,calculate the resistor resistance.
 If bandwidth was cut to 25 kHz ,determine the expected output meter reading.
- 3- An amplifier operating over a 4-MHz bandwidth has a $100-\Omega$ source resistance. It is operating at , has a voltage gain of 200, and has an input signal of 5 μ Vrms. Determine the rms output signals (desired and noise), assuming external noise can be disregarded.
- 4- An amplifier of power gain 20 dB has an input consisting of 100 μ W signal power and a 1 μ W noise power. If the amplifier contributes an additional 100 μ W of noise. Determine:
 - a) the output signal to noise ratio
 - b) Noise factor
 - c) Noise figure
- 5- For Rin = 600Ω , Rs = 50Ω and R_n = 400Ω for a signal source of 1µV and bandwidth 10 kHz.

Calculate noise voltage ,then get S/N



6- Calculate the S/N for a receiver output 4V signal and 0.48 noise both as ratio and in decibel form. If S/N ratio of 110 at its input . Calculate the receiver's noise figure and noise frame.

7- Amplifier with gain of 55 dB, bandwidth 1 MHz. and Noise Temperature of 1000°K adds noise power at its output of: *GKTeB*

8- A chain of 3 amplifiers each with a gain of 20 dB and Noise Figure of 3 dB have as the input a signal with S/N of 60 dB. What is the S/N of the output signal ?

9- A three stage amplifier system has a bandwidth of $3.14*10^{5}$ Hz determined by an LC tune circuit at its input ,and operates at 22°C. The first stage has a power gain of 14 dB and F=3 dB. The second and third stages are identical, with power gain of 20 dB and F=8 dB. The output load is 300 Ω . The input noise is generated by a 10-k Ω resistor. Calculate

- (a) The noise voltage and power at the input and the output of this system assuming ideal noiseless amplifiers.
- (b) The overall noise figure for the system.
- (c) The actual output noise voltage and power.

10- An amplifier with noise figure=6 dB has S/N=25 dB at the input calculate the S/N at the ouput in dB and as ratio.

11- You are working on a single stage amplifier that has 200-kHz bandwidth and a voltage gain of 100 at room temperature. The external noise is negligible. A 1-mV signal is applied to amplifier's input. If the amplifier has a 5-dB NF and the input noise is generated by a 2-k Ω resistor, what output noise voltage would you predict?