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Department of Electrical Engineering



EEE/ECE F311

Communication Systems

Tutorial-10

Date : 23/10/2025

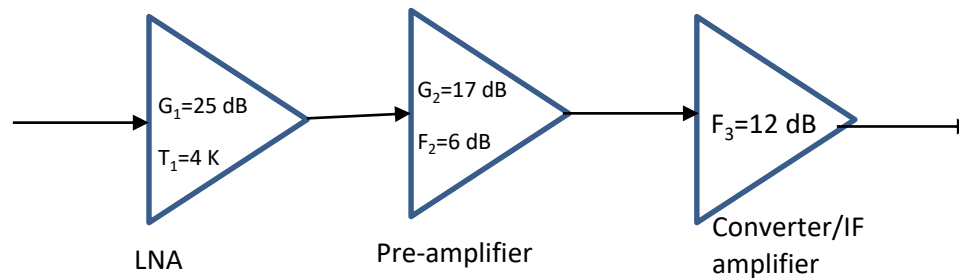
Date : 28/10/2025

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1. Obtain the equivalent noise temperature of the following low noise receiving system. Assume room temperature to be 17°C .

Given values

- Low noise amplifier power gain= $G_1 = 25 \text{ dB}$
- Low noise amplifier noise temperature= $T_1 = 4 \text{ K}$
- Pre-amplifier power gain= $G_2 = 17 \text{ dB}$
- Pre-amplifier noise figure= $F_2 = 6 \text{ dB}$
- Converter and IF amplifier noise figure= $F_3 = 12 \text{ dB}$



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1. Solution:
equivalent noise temperature = 7.025°K

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2. Find the overall noise figure of a three stage cascaded amplifier , each stage is having a power gain of 10 db and noise figure of 6 dB.

2. Solution:

noise Figure = 4.33=6.365 dB

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3. An amplifier is operating over the frequency range from 18 to 20 MHz has a $10\text{ k}\Omega$ input resistor. Calculate the rms noise voltage at the input to this amplifier if the ambient temperature is 27°C .

3. Solution:

Rms noise voltage = $18.2\text{ }\mu\text{V}$

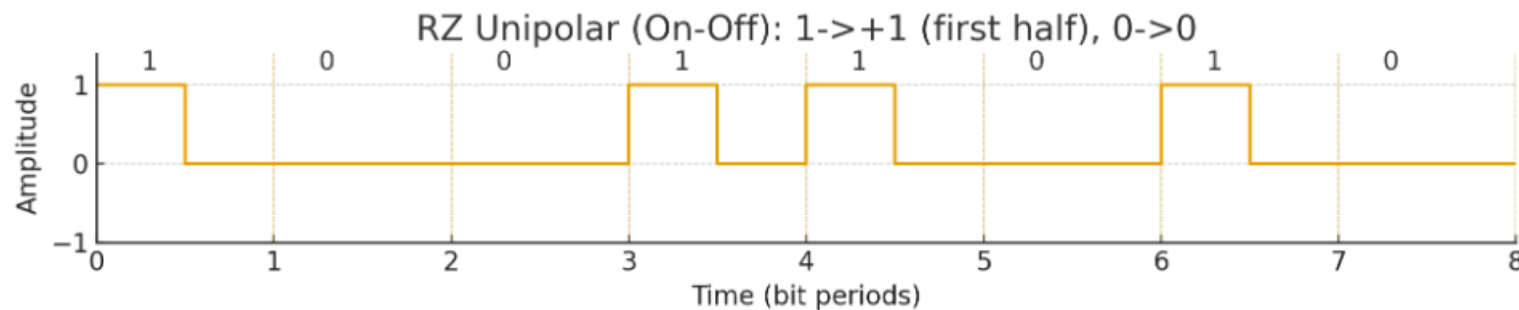
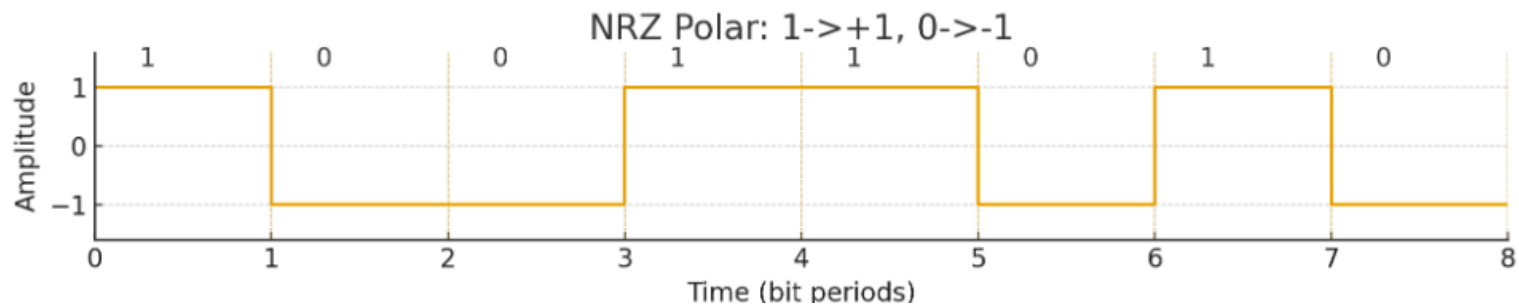
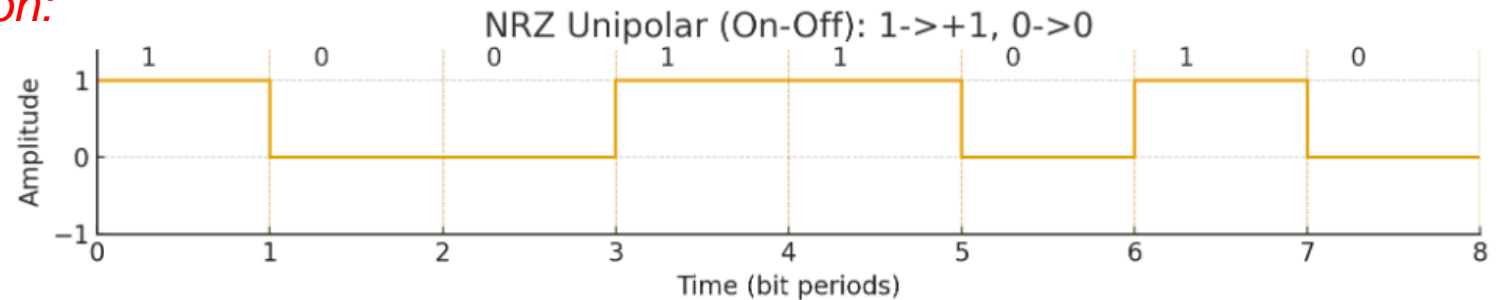
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4. A random Binary data sequence 1 0 0 1 1 0 1 0 is to be transmitted.

- (i) Sketch the transmitted waveform for NRZ on- off (unipolar) coding.*
- (ii) Sketch the transmitted waveform for NRZ polar coding.*
- (iii) Sketch the transmitted waveform for RZ on- off (unipolar) coding.*
- (iv) Sketch the transmitted waveform for RZ polar coding.*
- (v) Sketch the transmitted waveform for RZ Bipolar AML coding.*

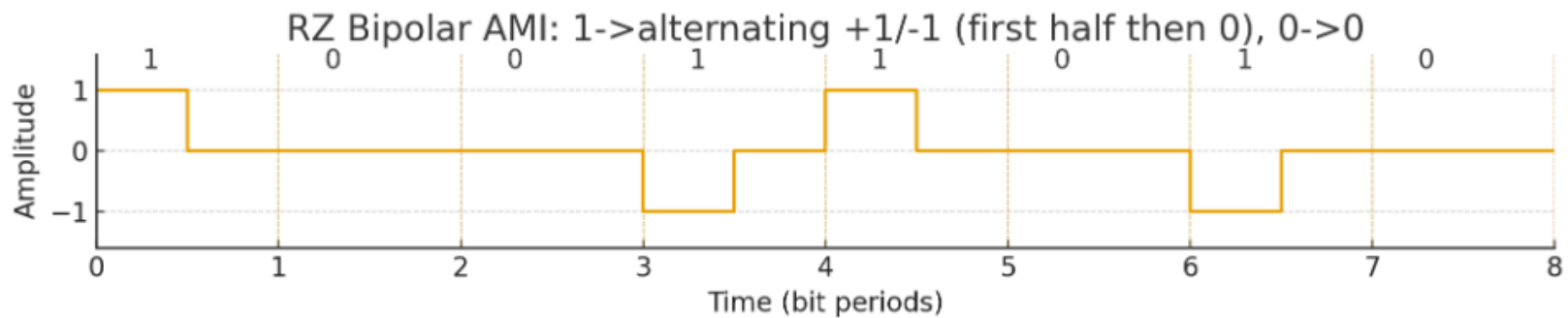
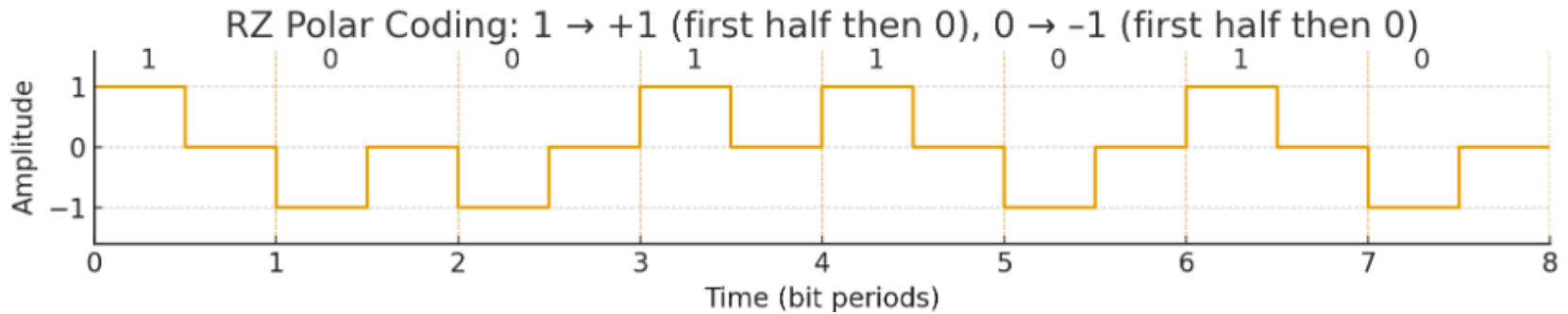
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4. Solution:



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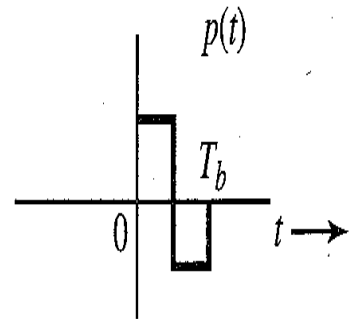
4. Solution:



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5. A random Binary data sequence 1 0 0 1 1 0 is to be transmitted using a Manchester code with a pulse shape as in Fig.

Sketch the transmitted waveform.



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Solution 5

Manchester code is a Polar code : “1” is transmitted by $p(t)$ and “0” is transmitted by $-p(t)$

