

NATIONAL UNIVERSITY OF SCIENCE AND TECHNOLOGY

ELECTRONIC ENGINEERING DEPARTMENT

COMMUNICATION SYSTEMS PERFORMANCE TEE5122 ASSIGNMENT 1

DUE DATE: 26/11/2021

1. Two resistors $20\text{k}\Omega$ and $50\text{k}\Omega$ are at room temperature 290°K . Calculate for the bandwidth of 100kHz , the thermal noise for

- i. Each resistor
- ii. The two resistors in series
- iii. The two resistors in parallel. [20]

2. The equivalent noise resistance for an amplifier is 300Ω and the equivalent shot noise current is $5\mu\text{A}$. The amplifier is fed from a 150Ω $10\mu\text{V}$ rms sinusoidal signal source. Calculate the individual noise voltage and the input signal to ratio in decibels given that the noise bandwidth is 10MHz . [20]

3. Derive and plot the auto correlation function of a white Gaussian noise which has a power spectral density of $\frac{N_0}{2}$. [15]

4. White noise with a one sided PSD is passed through a low pass filter whose transfer function is specified as $H(f) = 2e^{-jf}$. Determine the output power spectral density. [15]