

Department of Electrical & Electronics Engineering

**Abdullah Gül University**

**EE3001 DSP Lab 4**

**Submitted on:**

**05.22.24**

**Submitted by:**

**Oğuzhan Alasulu**

|  |  |  |
| --- | --- | --- |
|  |  | |
|  |  |  | |

**Lab Instructors: Oğuzhan Ayyıldız**

**Grade: / 100**

**A graph of a frequency

Description automatically generated with medium confidence  
A screen shot of a graph

Description automatically generated**

**A screen shot of a graph

Description automatically generated  
A screen shot of a graph

Description automatically generatedA screenshot of a graph

Description automatically generated**

The experiments exposed that frequency response plots and spectrograms shows the sound signal features. The frequency response graph shows how the amplitude of various frequency components differs, while the spectrogram explains the frequencies over time.

A single-frequency tone shows the frequency response, showing the existence of that specific frequency component. Through listening to the input sounds, it becomes obvious that they are produced at different frequencies. The presence of different frequencies in the frequency response graph is showing that a limitation applied by the sampling rate on frequency resolution. This limitation is directed by the sampling theorem, also known as the Nyquist theorem, which specifies the reproduce a signal, the sampling rate must be at least twice the signal of highest frequency. The Nyquist theorem shows that:

Where:

When the frequency of signal passes the Nyquist frequency, its higher components are changed as lower frequencies during sampling.

Where,

= An integer

= Sapling Frequency