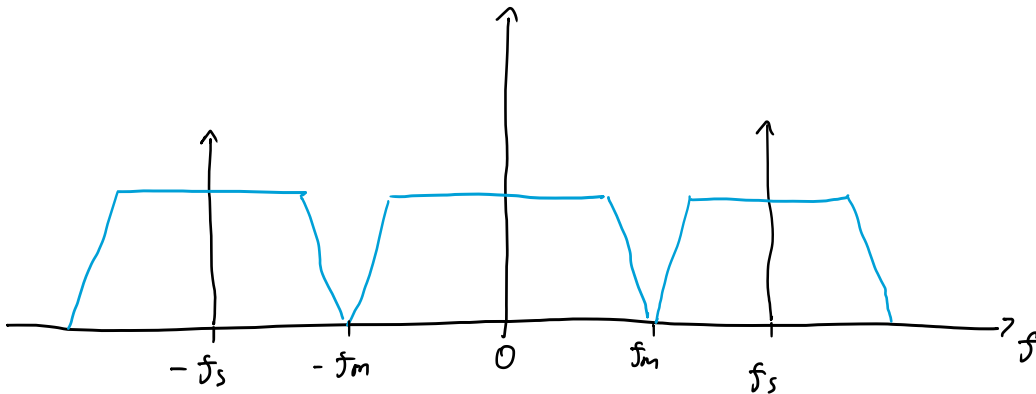M. Hasyim Abdillah P.   1101191095   TT-43-11

1. a. Sampling artinya mengambil atau mencuplik sinyal analog.

   b. Kuantisasi artinya mengubah level amplituda menjadi diskrit dengan jumlah terbatas.

   c. Encoding artinya mengubah sinyal analog yang telah dikuantisasi menjadi sinyal digital.

   $N = 8$ bit

   Kecepatan sampling $= 8000$ sample/s

2. $BW = f_s = 8000$ sample/s $= 8000$ Hz
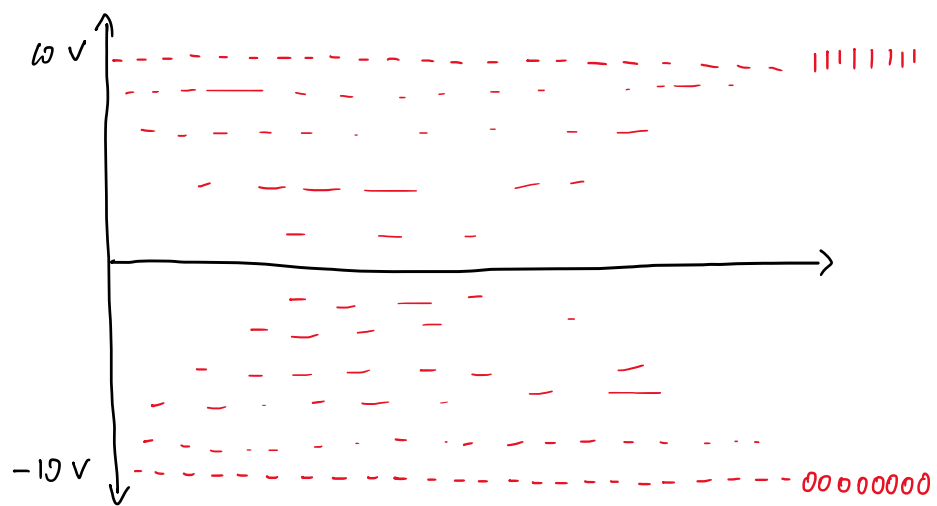
Proses Sampling

Proses Kuantisasi & Encoding

$$M = 2^N$$

$$\frac{2V}{\Delta V} = 2^N$$

$$\frac{2.10}{\Delta V} = 2^8$$

$$\frac{20}{\Delta V} = 256 \rightarrow \Delta V = \frac{20}{256} = 0,078125 \ V = 78,125 \ mV$$

6 V

−6 V

|| | | || |

0 0 0 0 0 0 0

2. $P(s_1) = P(s_2) = 0,5$

$$\frac{\eta}{2} = 10^{-9} \, W/Hz \rightarrow \eta = 2 \times 10^{-9} \, W/Hz$$

$A = 10 \, mV$

$R_b = 10 \, kbps = 10.000 \, bps$

a.
$$P_e = Q\left(\sqrt{\frac{A^2}{\sigma^2}}\right) = Q\left(\sqrt{\frac{A^2}{\eta \cdot BW}}\right) = Q\left(\sqrt{\frac{A^2}{\eta \cdot \frac{R_b}{2}}}\right)$$

$$= Q\left(\sqrt{\frac{A^2}{\frac{\eta}{2} \cdot R_b}}\right)$$

$$= Q\left(\sqrt{\frac{(10 \, mV)^2}{10^{-9} \cdot 10.000}}\right)$$

$$= Q\left(\sqrt{10}\right)$$

$$= Q(3,16)$$

$$= 0,0008$$

$$= 0,08 \, \%$$

b. $0,08 \% = Q(\sqrt{10}) = Q\left(\sqrt{\frac{A^2}{\frac{\eta}{2} \cdot R_b}}\right)$; $R_{b2} = 100 \, kbps = 10^5 \, bps$

$$\sqrt{10} = \sqrt{\frac{A_2^2}{\frac{\eta}{2} \cdot R_{b2}}}$$

$$10 = \frac{A_2^2}{10^{-9} \cdot 10^5}$$

$$A_2^2 = 10^{-3} \rightarrow A_2 = \sqrt{10^{-3}} = 0,032 \, V = 32 \, mV$$