



Credit Hours
System- ELCN306



Cairo University
Faculty of Engineering

Communications 1

Final Assessment

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Test Case 1

Givens:

- $m(t) = 5 \cos(2\pi f_m t)$
- $f_m = 10$
- $f_s = 40$
- $\mu = 0$
- $L = 8$
- $m_p = 5$
- Unipolar NRZ

Results:

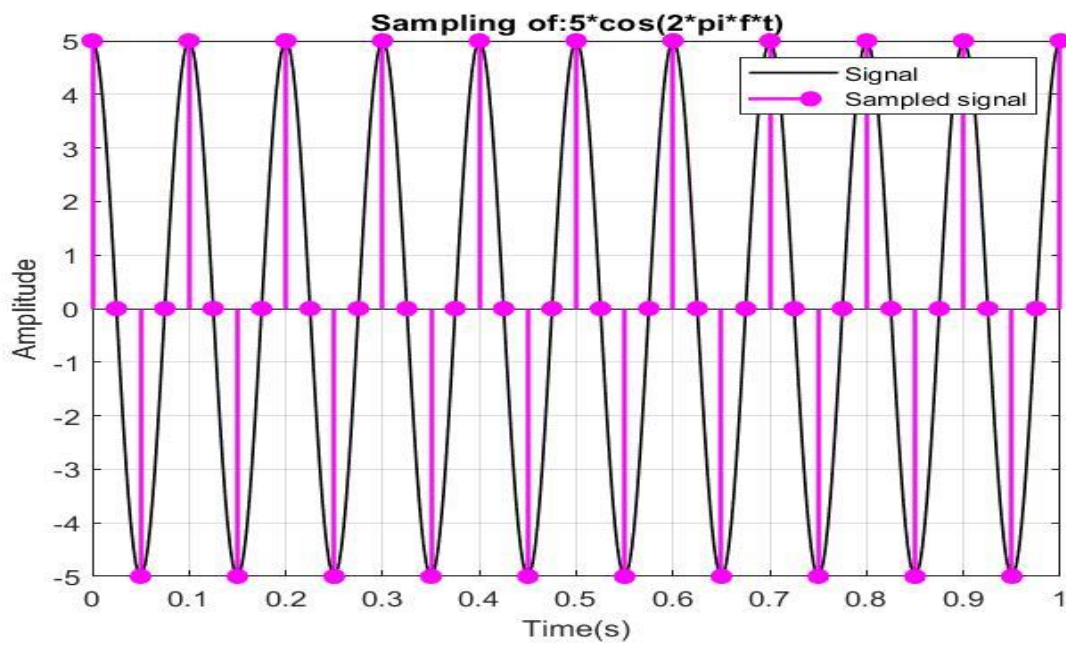


Figure 1_Test_Case_1_Sampler

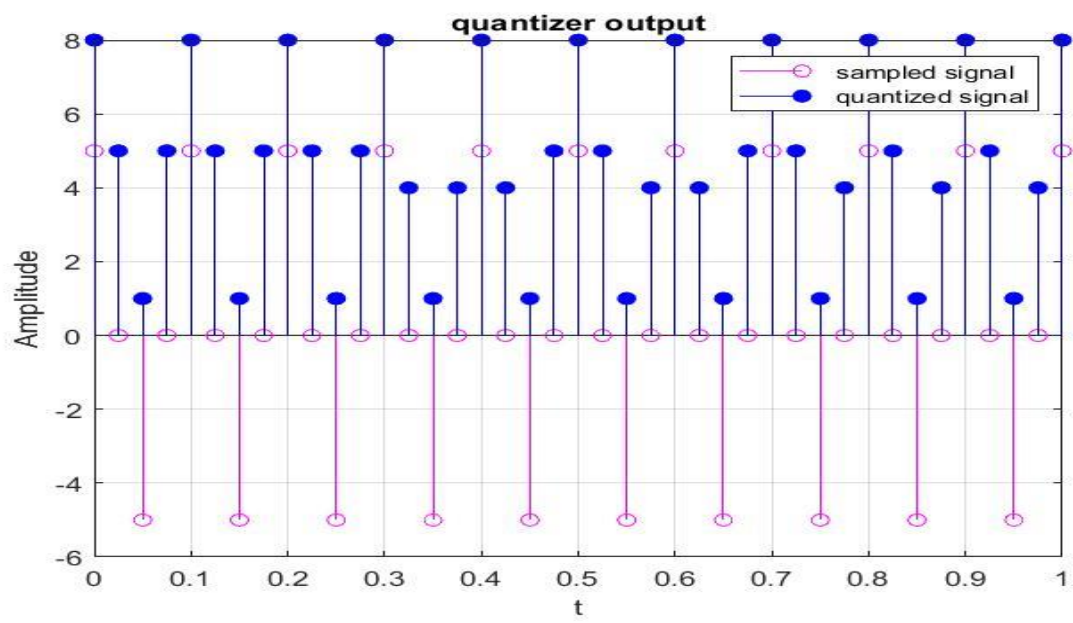


Figure 2_Test_Case_1_Quantizer

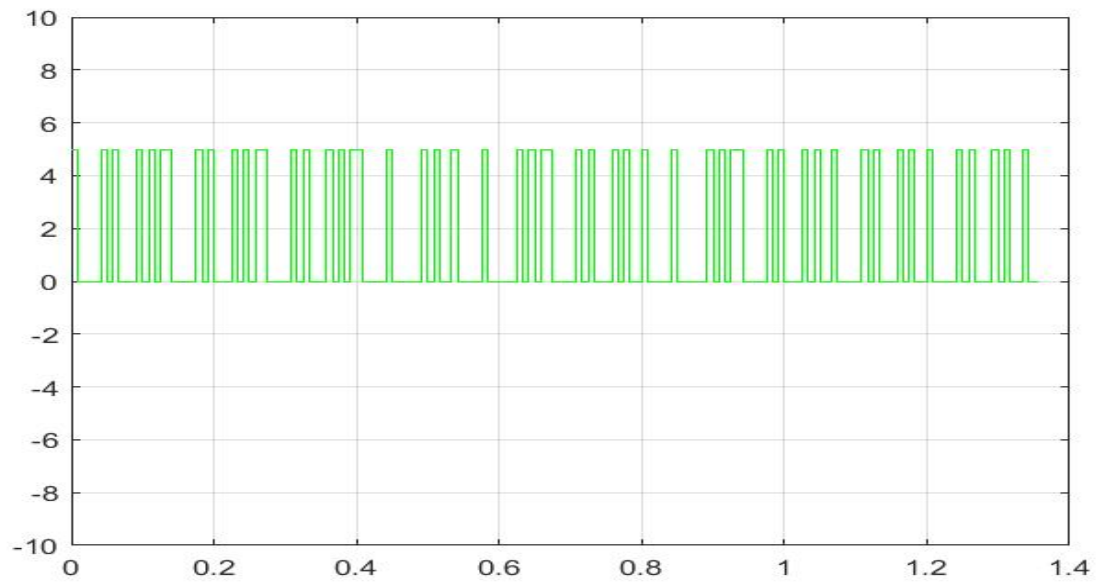


Figure 3_Test_Case_1_Encoder_UniPolar

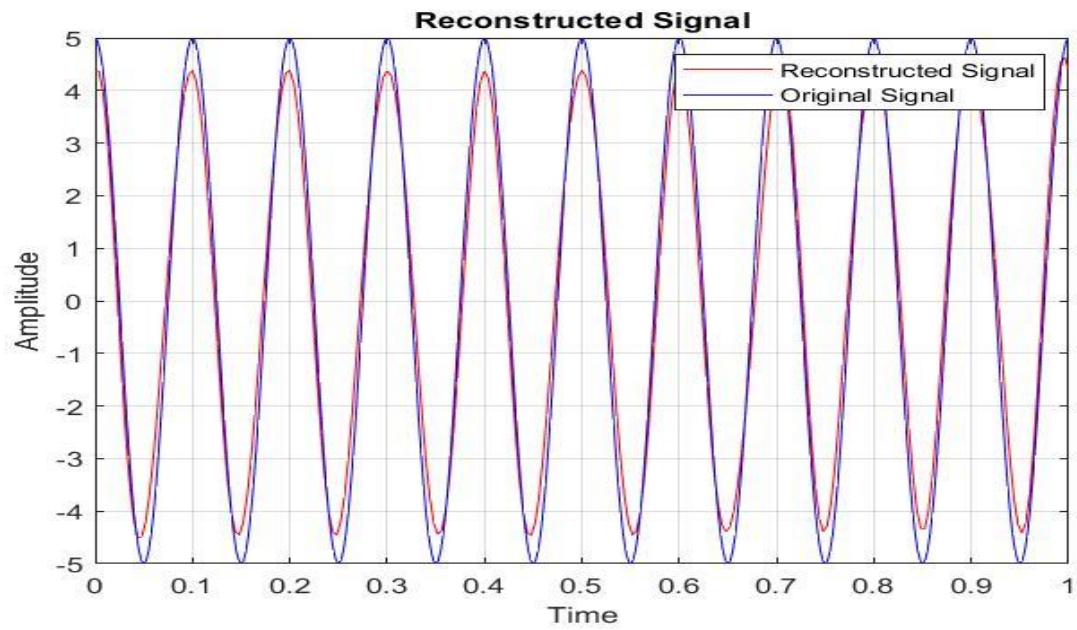


Figure 4_Test_Case_1_Resconstructed

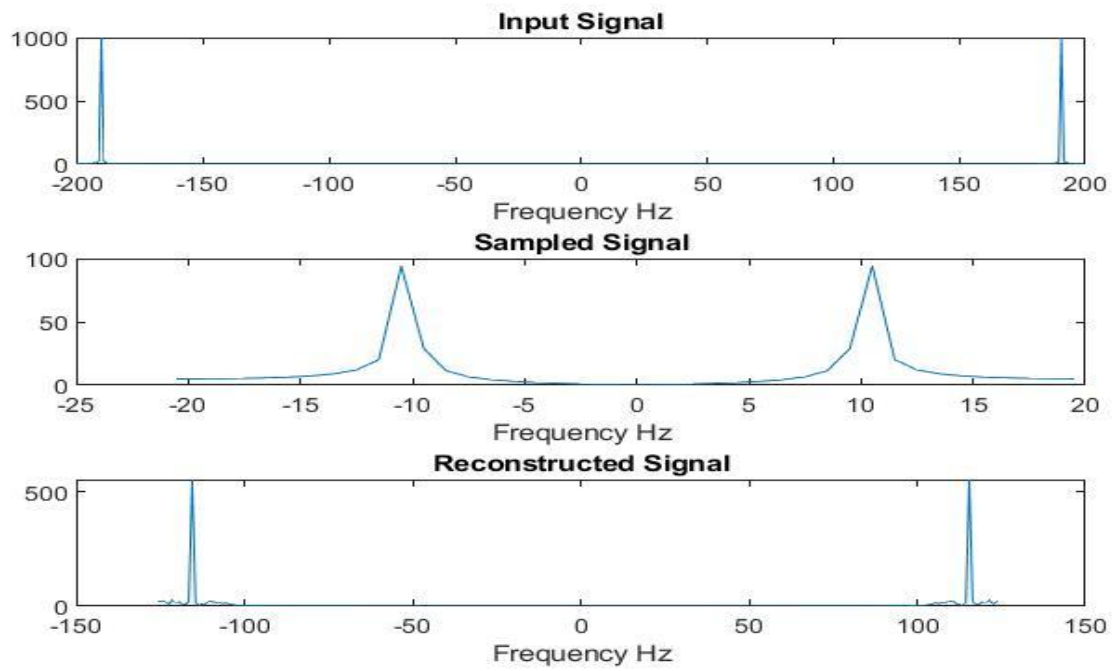


Figure 5_Test_Case_1_Combined

Comments:

- When $f_s=40$ the signal can be reconstructed since $f_s > 2BW$.
- There is a difference between the sampled message and the quantized message due to the quantization error and can be decreased by increasing number of quantization levels.

Test Case 2

Givens:

- $m(t) = 5 \cos(2\pi f_m t)$
- $f_m = 10$
- $f_s = 20$
- $\mu = 0$
- $L = 32$
- $m_p = 5$
- Polar NRZ

Results:

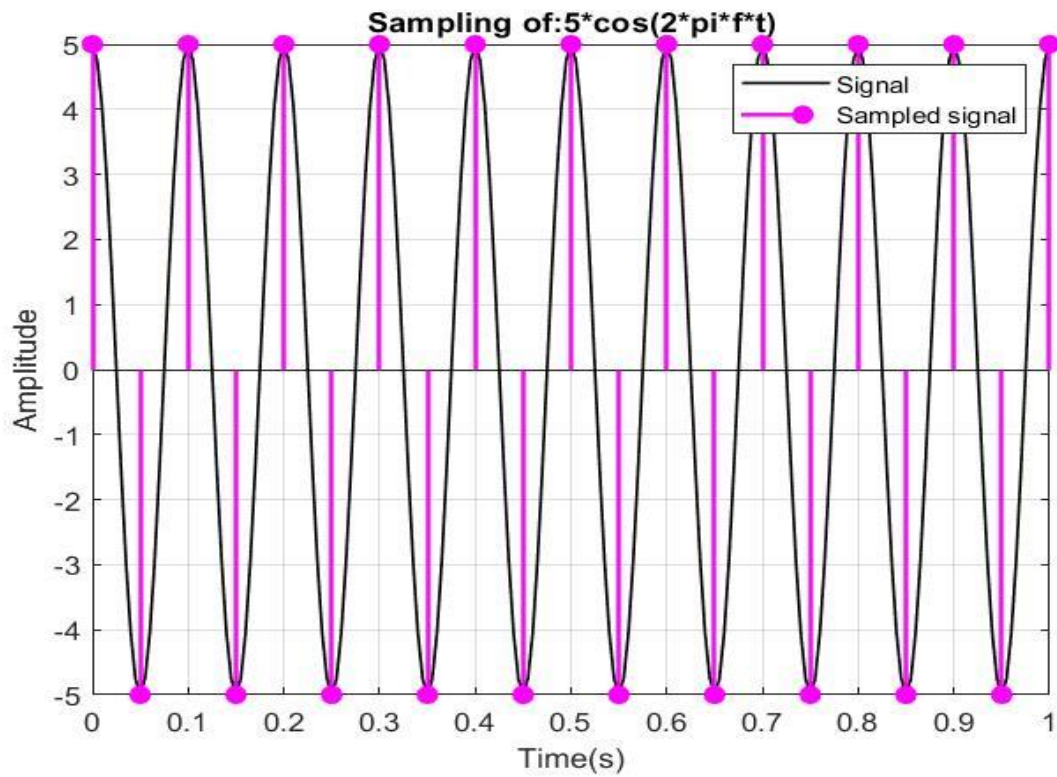


Figure 6_Test_Case_2_Sampler

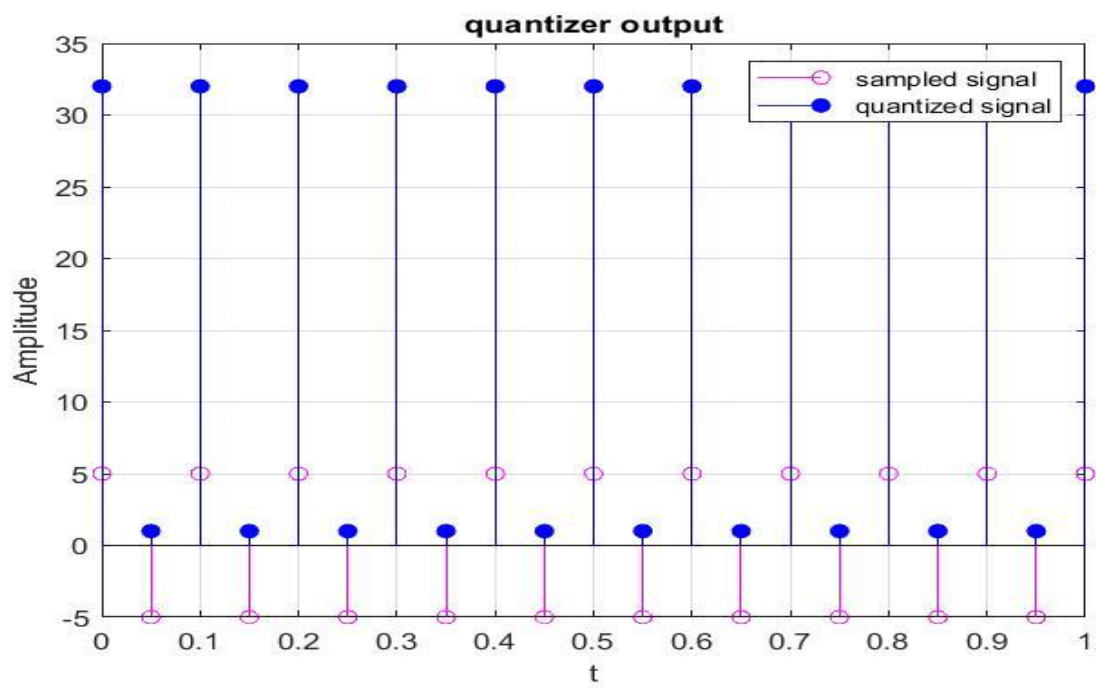


Figure 7_Test_Case_2_Quantizer

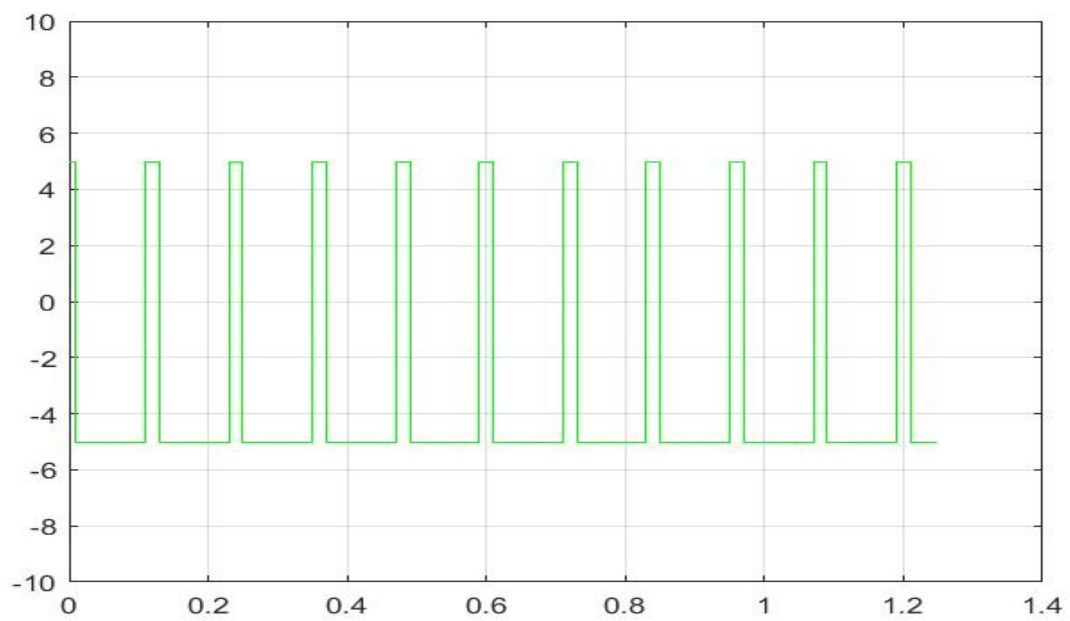


Figure 8_Test_Case_2_Encoder_Polar

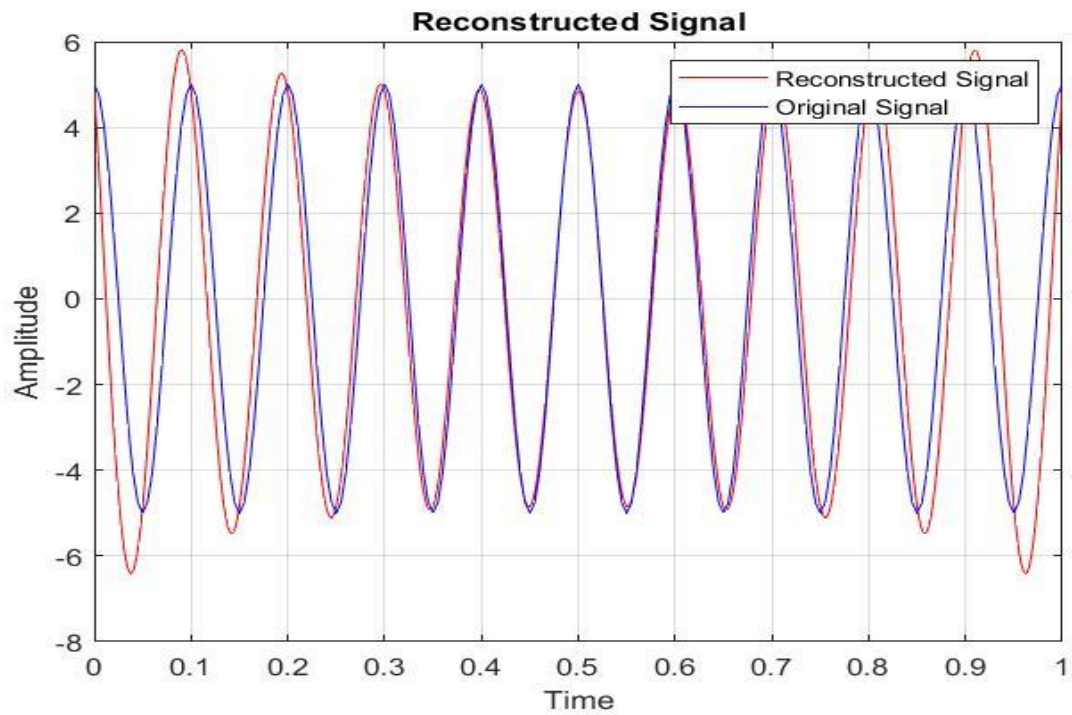


Figure 9_Test_Case_2_Resconstructed

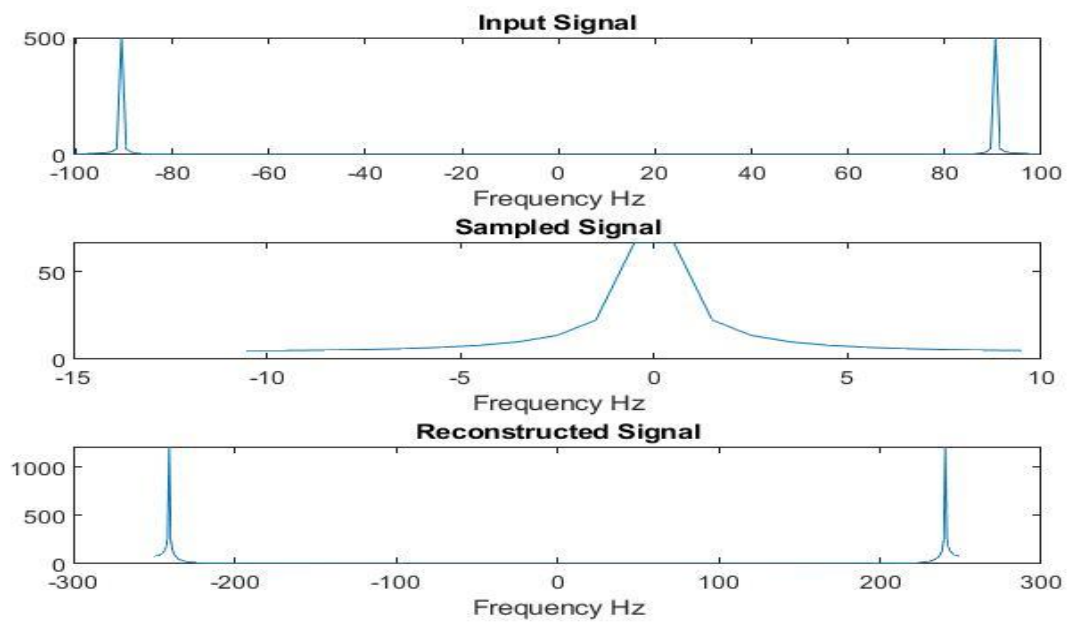


Figure 10_Test_Case_2_Combined

Comments:

- When $f_s = 20$ the signal can be reconstructed since $f_s = 2BW$.
- The sampled message and the quantized message are almost the same as the quantization level is high as $L=32$.

Test Case 3

Givens:

- $m(t) = 5 \cos(2\pi f_m t)$
- $f_m = 10$
- $f_s = 20$
- $\mu = 100$
- $L = 32$
- $m_p = 5$
- Manchester

Results:

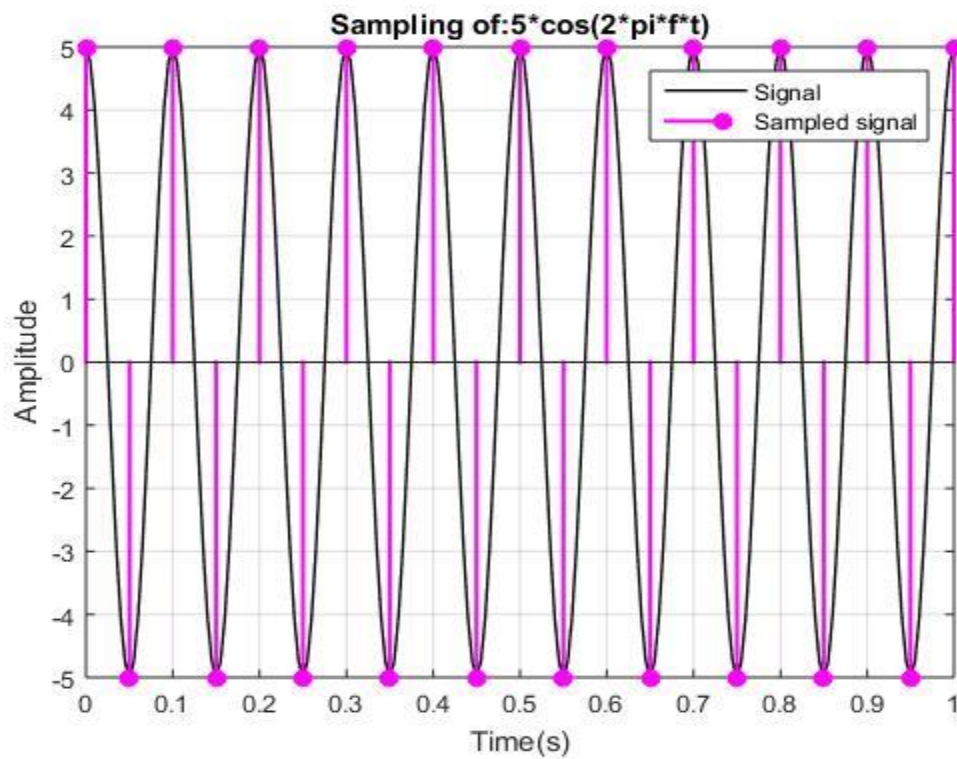
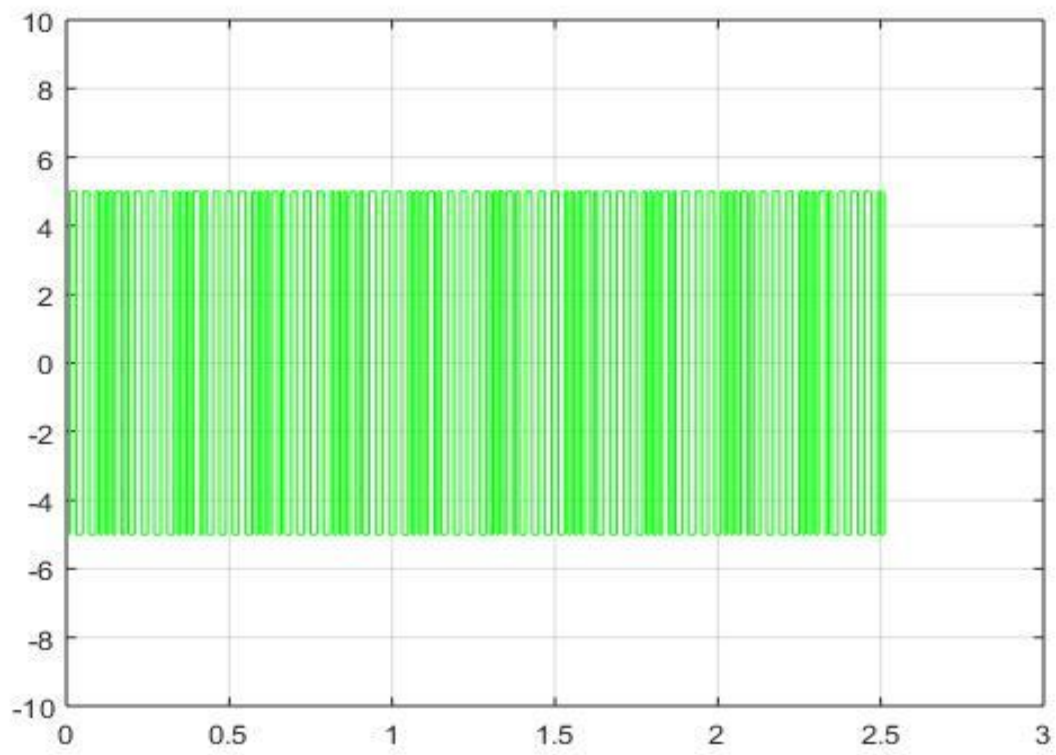
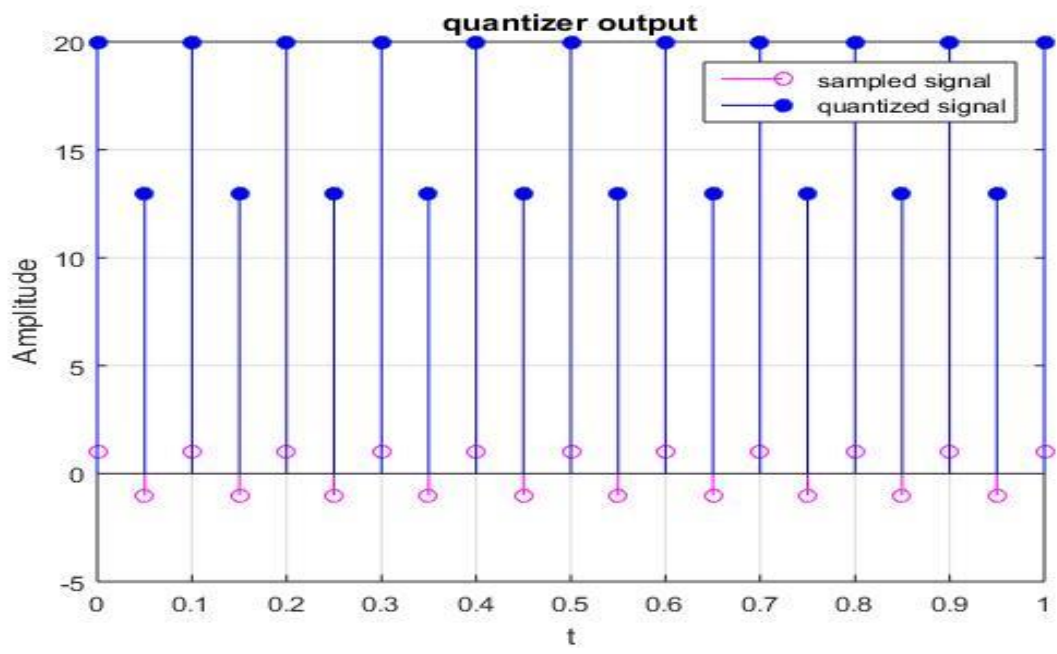


Figure 11_Test_Case_3_Sampler



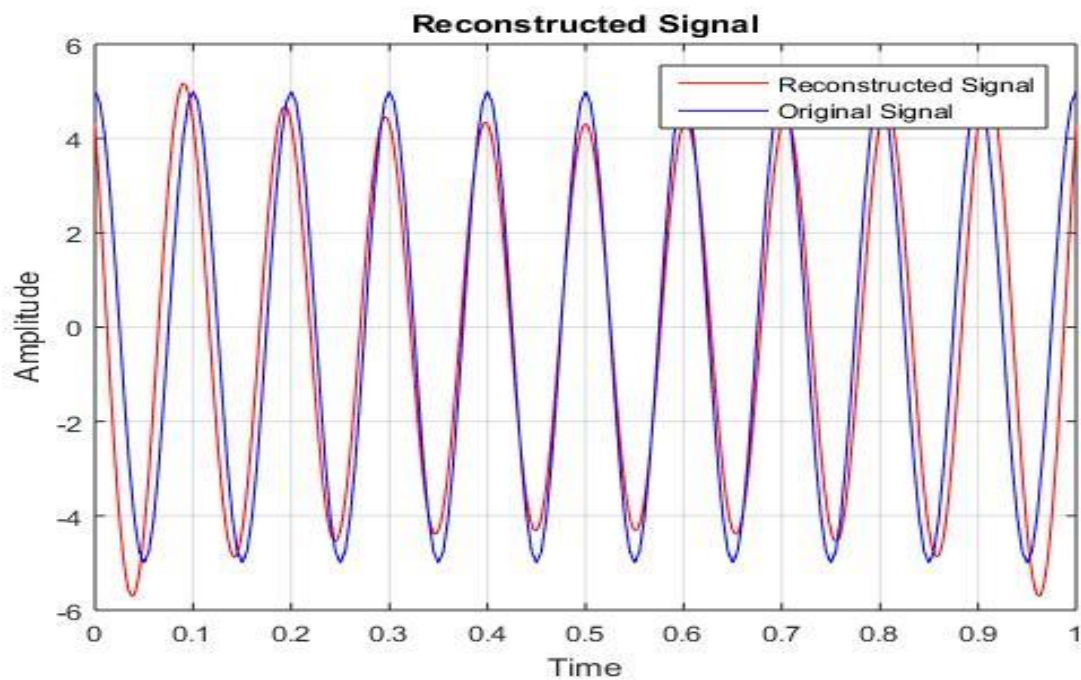


Figure 14_Test_Case_3_Reconstructed

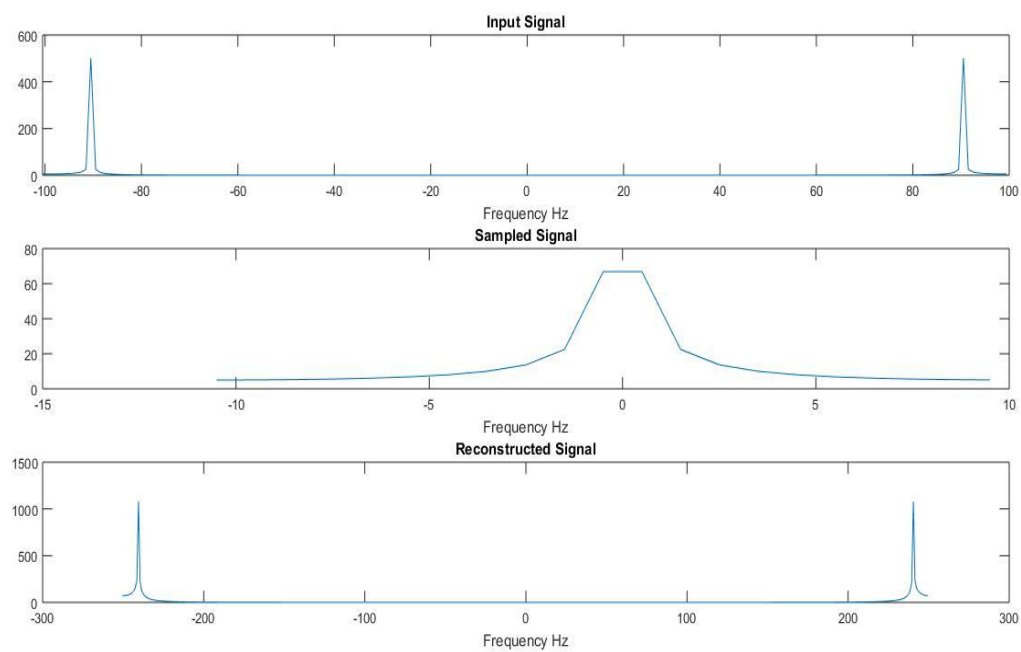


Figure 15_Test_Case_3_Combined

Comments:

- This is the only test case that employs companding rather than uniform quantization which of course will save the range that would have been wasted if we used uniform quantization.
- When a non-uniform quantization is used the signal is compressed.

Test Case 4

Givens:

- $m(t) = 5 \cos(2\pi f_m t)$
- $f_m = 10$
- $f_s = 15$
- $\mu = 0$
- $L = 16$
- $m_p = 5$
- Unipolar NRZ

Results:

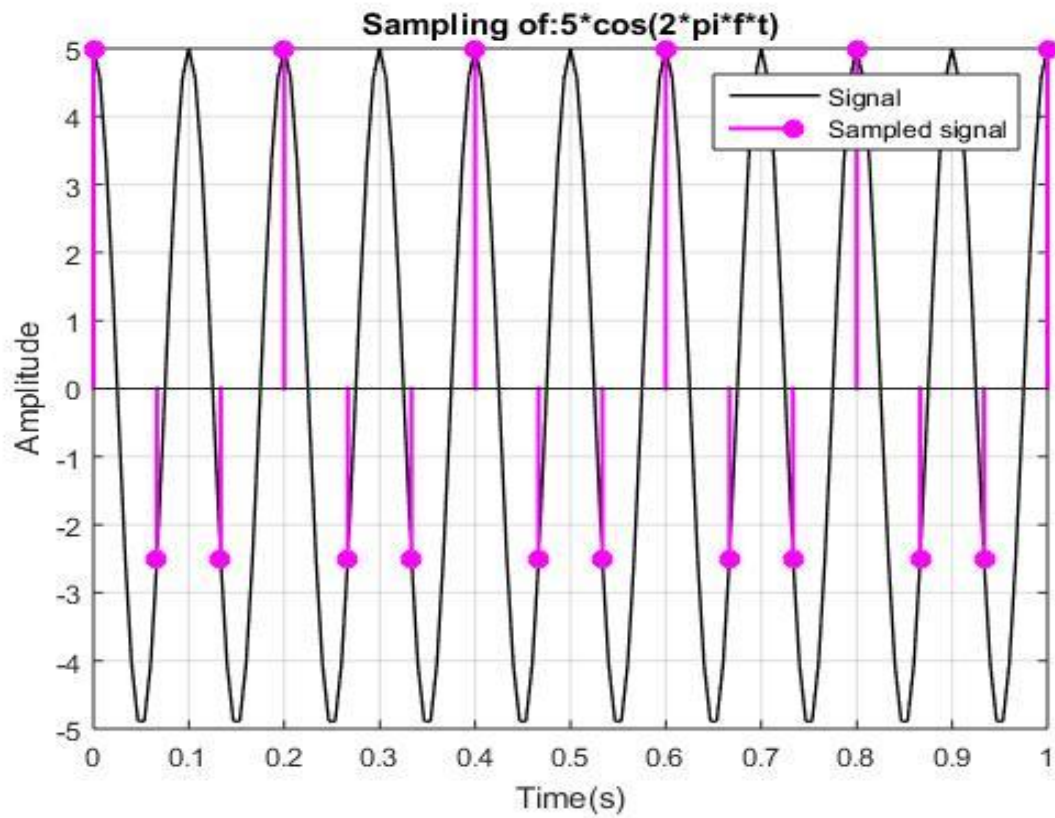


Figure 16_Test_Case_4_Sampler

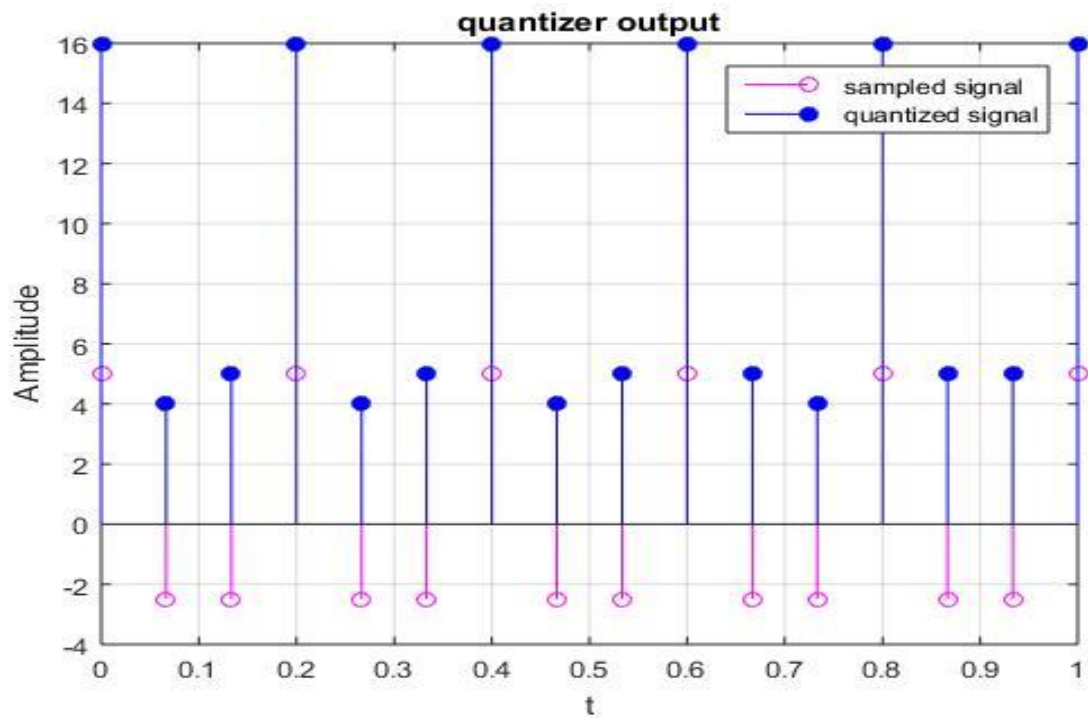


Figure 17_Test_Case_4_Quantizer

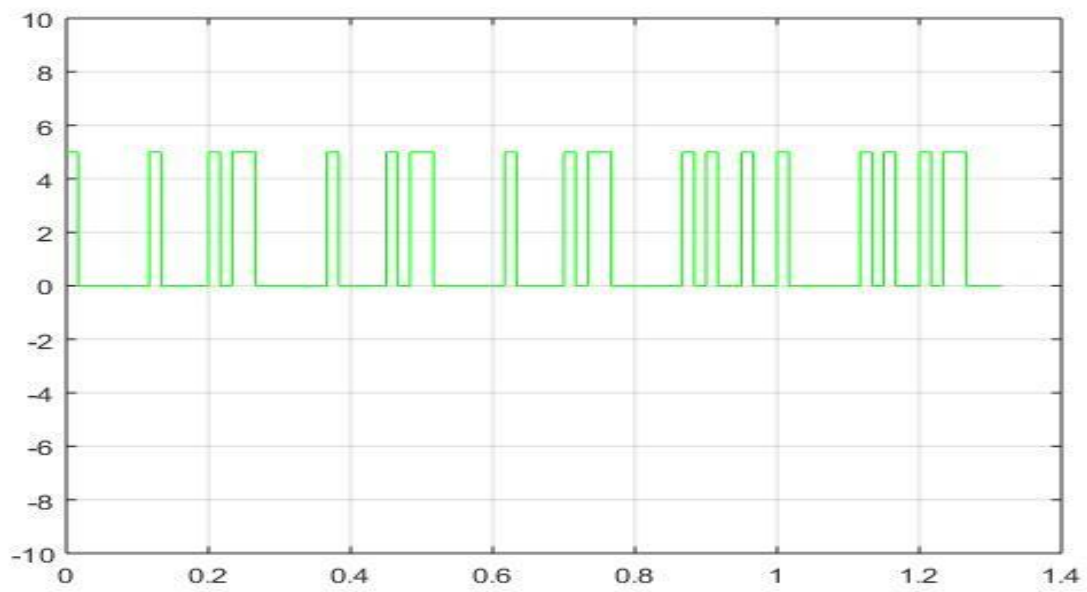


Figure 18_Test_Case_4_Encoder_Unipolar

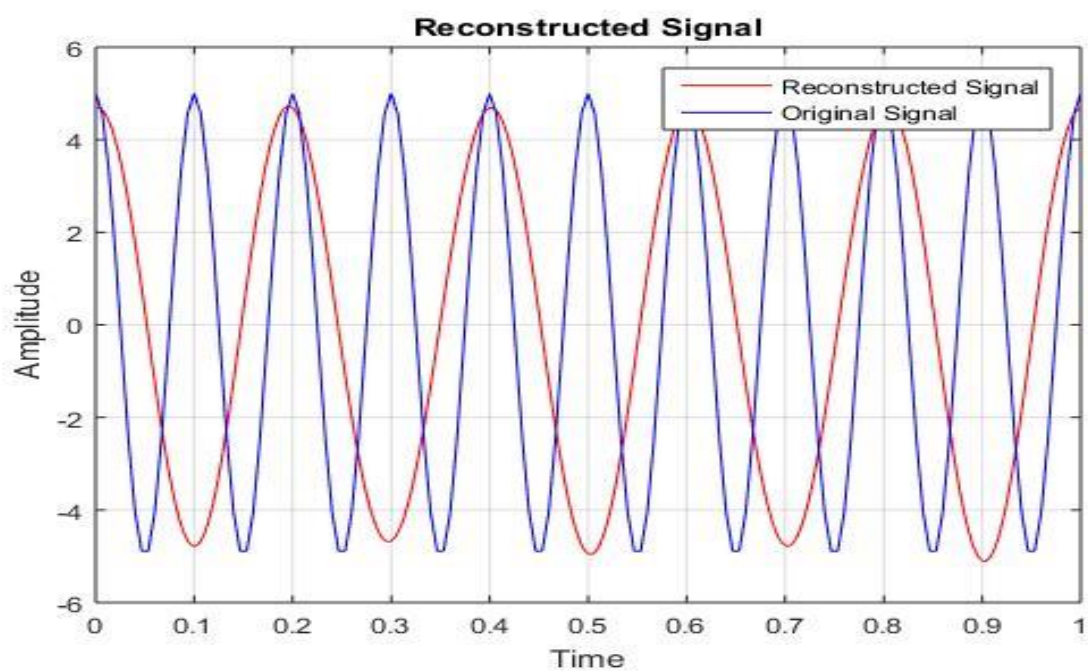


Figure 19_Test_Case_4_Reconstructed

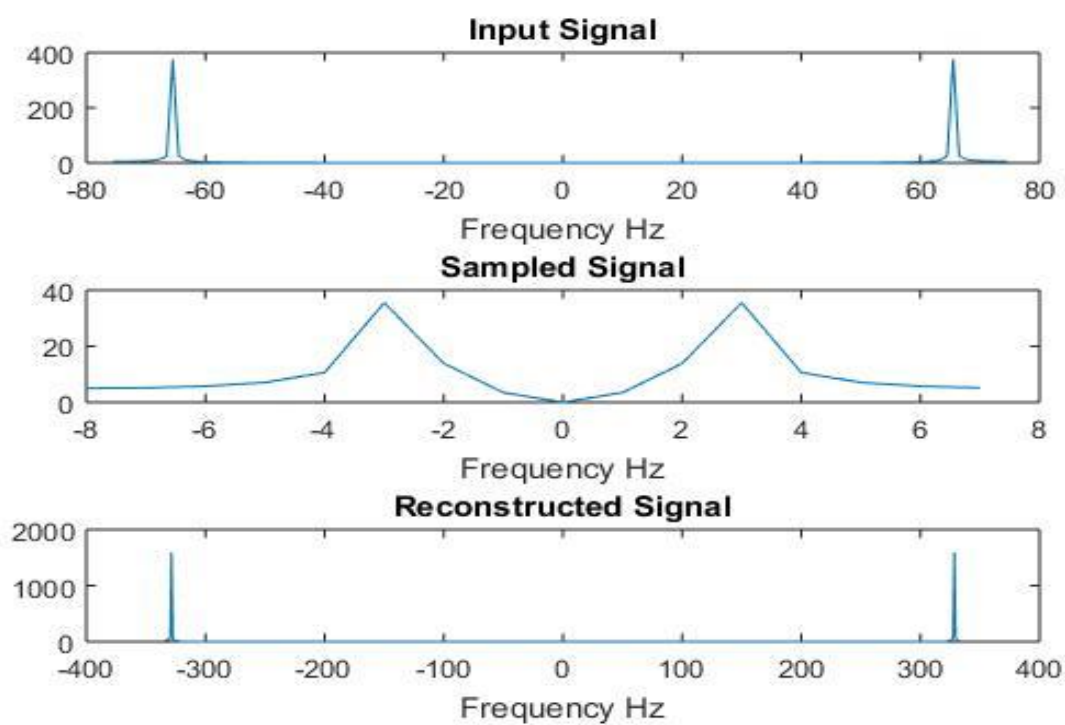


Figure 20_Test_Case_4_Combined

Comments:

- When $f_s=15$ the signal cannot be reconstructed as $f_s < 2BW$
- Aliasing occur.

