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| **Credit Hours System- ELCN306** |

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| **Cairo University**  **Faculty of Engineering** |

**Communications 1**

**Final Assessment**

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# Test Case 1

Givens:

* m(t) = 5 cos (2πfmt)
* fm = 10
* fs = 40
* μ = 0
* L = 8
* mp = 5
* Unipolar NRZ

Results:

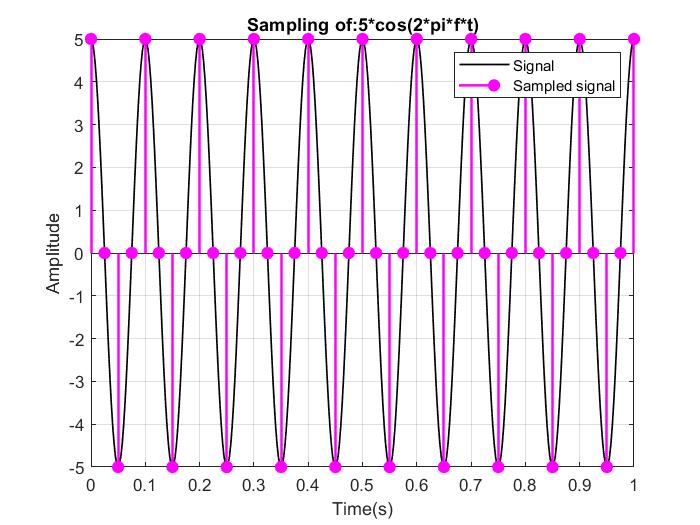


Figure 1\_Test\_Case\_1\_Sampler

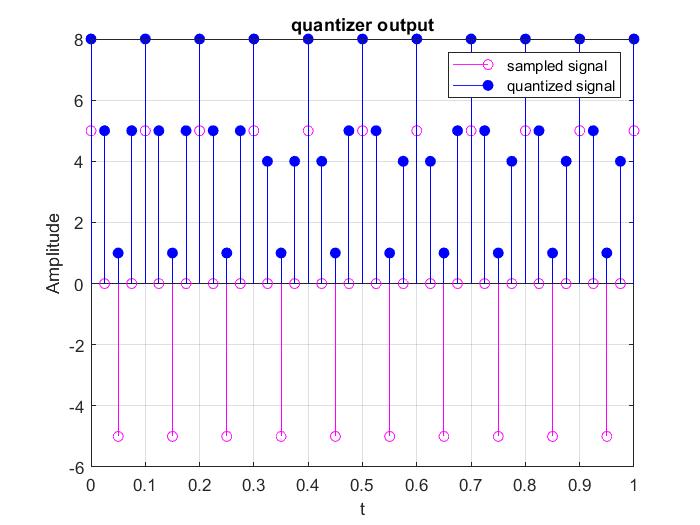


Figure 2\_Test\_Case\_1\_Quantizer

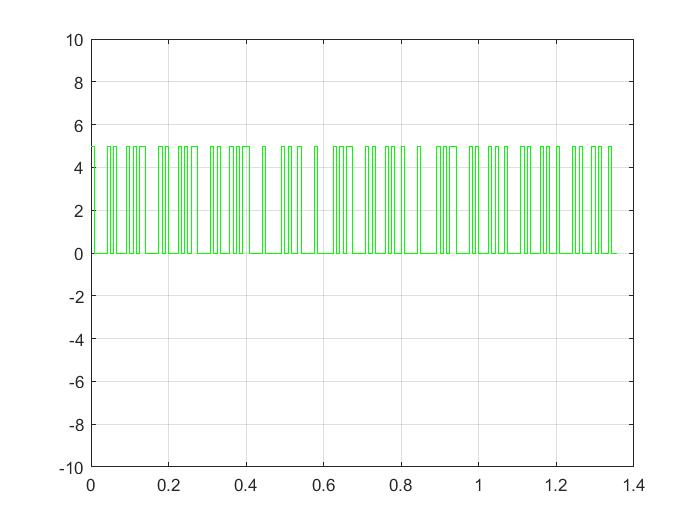


Figure 3\_Test\_Case\_1\_Encoder\_UniPolar

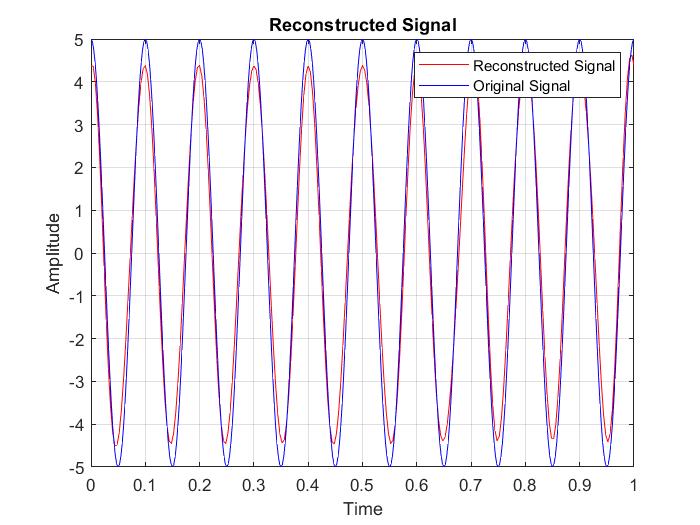


Figure 4\_Test\_Case\_1\_Resconstructed

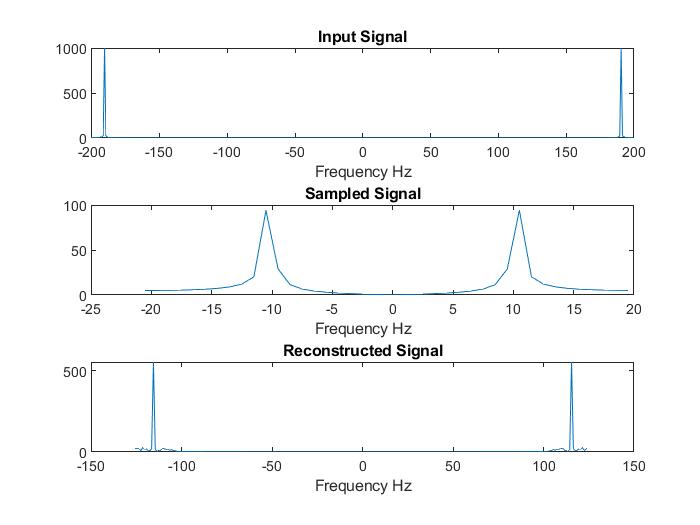


Figure 5\_Test\_Case\_1\_Combined

Comments:

* When fs=40 the signal can be reconstructed since fs 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 (2πfmt)
* fm = 10
* fs = 20
* μ = 0
* L = 32
* mp = 5
* Polar NRZ

Results:

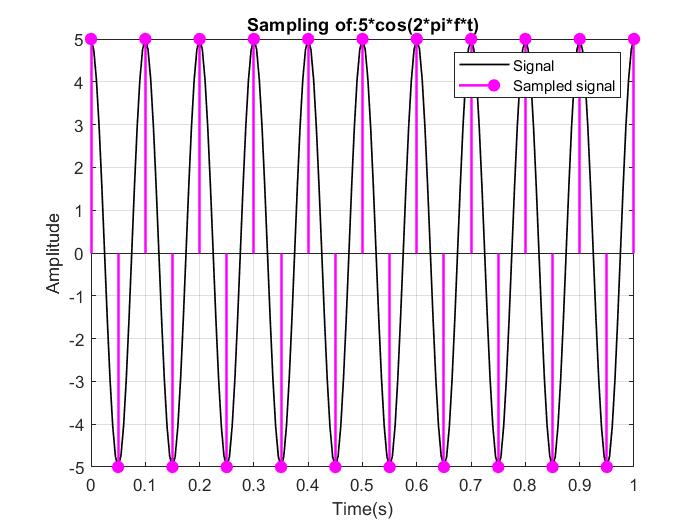


Figure 6\_Test\_Case\_2\_Sampler

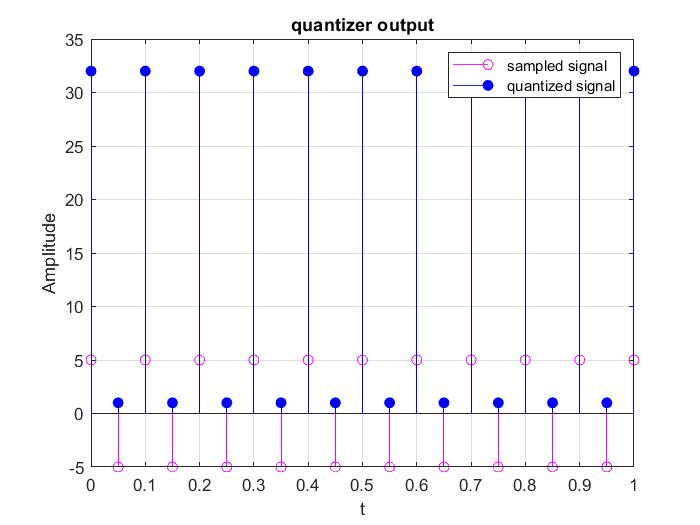


Figure 7\_Test\_Case\_2\_Quantizer

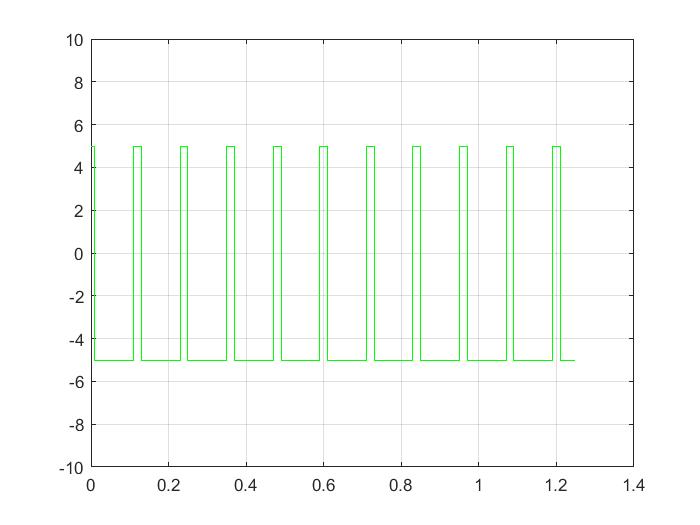


Figure 8\_Test\_Case\_2\_Encoder\_Polar

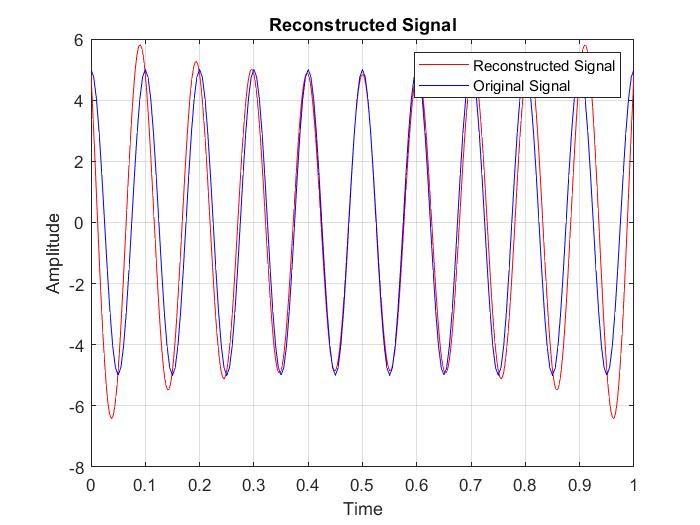


Figure 9\_Test\_Case\_2\_Resconstructed

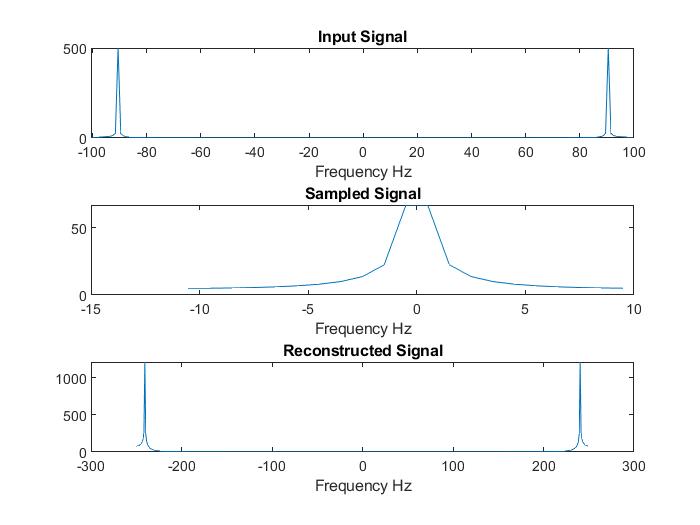


Figure 10\_Test\_Case\_2\_Combined

Comments:

* When fs = 20 the signal can be reconstructed since fs 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 (2πfmt)
* fm = 10
* fs = 20
* μ = 100
* L = 32
* mp = 5
* Manchester

Results:

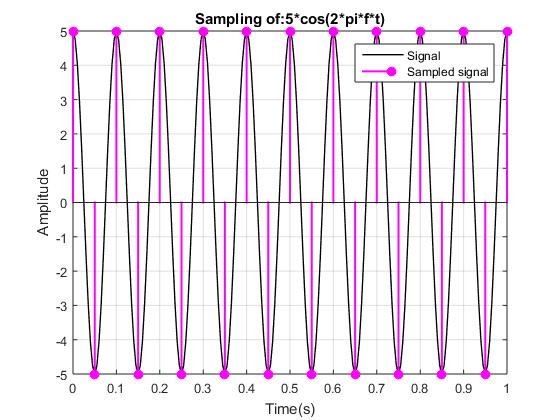


Figure 11\_Test\_Case\_3\_Sampler

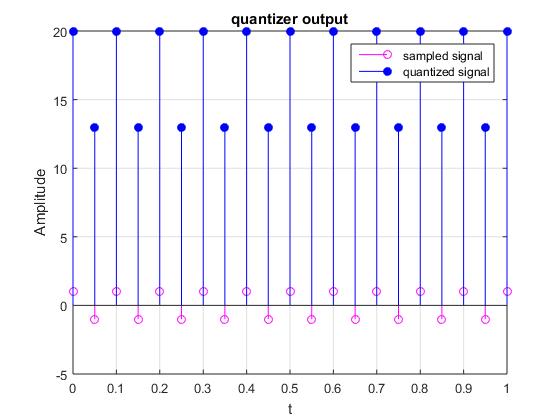


Figure 12\_Test\_Case\_3\_Quantizer

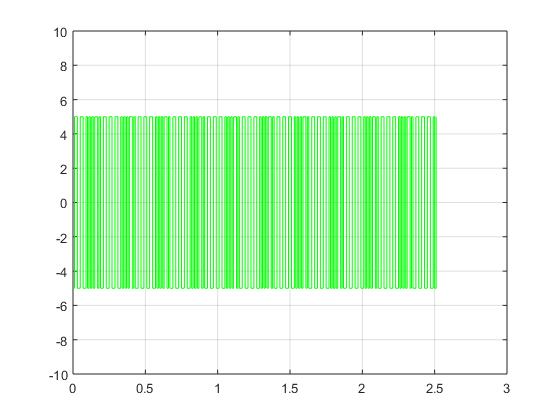


Figure 13\_Test\_Case\_3\_Encoder\_Manchester

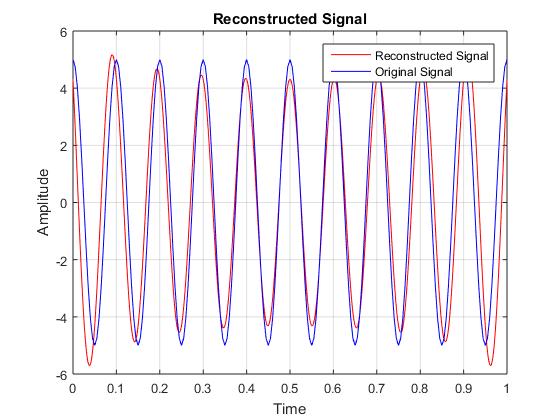


Figure 14\_Test\_Case\_3\_Resconstructed

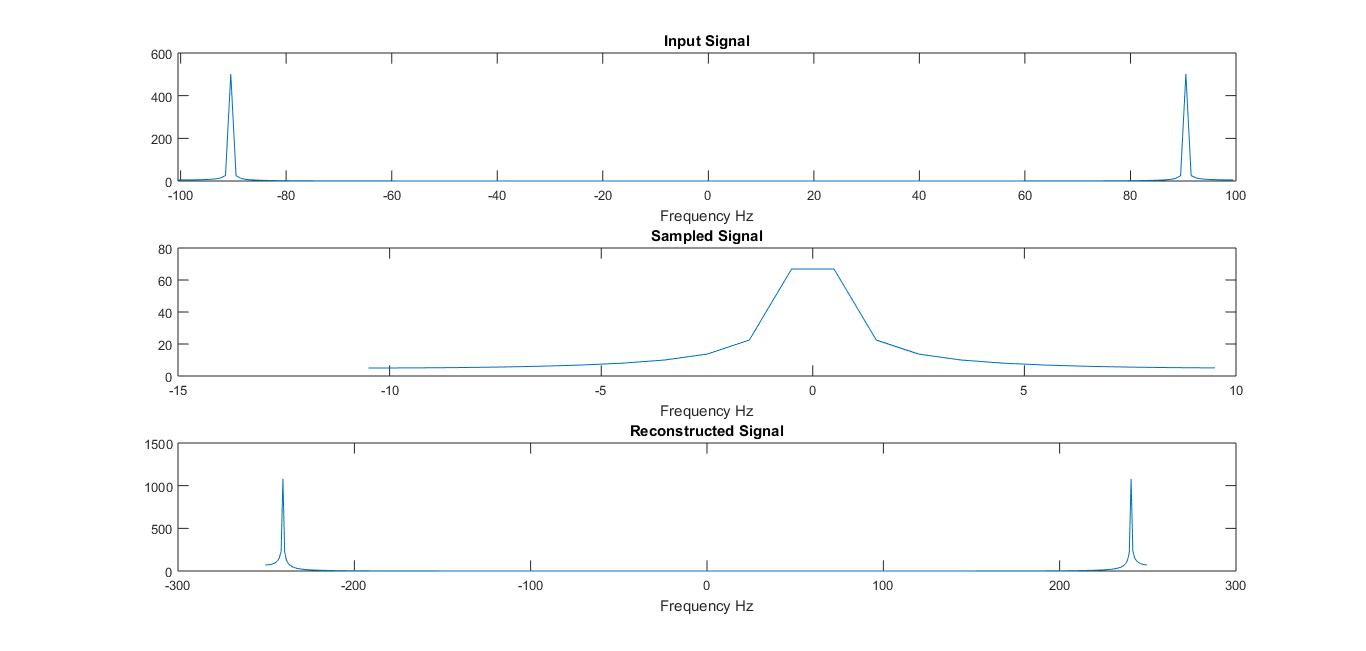


Figure 15\_Test\_Case\_3\_Combined

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 (2πfmt)
* fm = 10
* fs = 15
* μ = 0
* L = 16
* mp = 5
* Unipolar NRZ

Results:

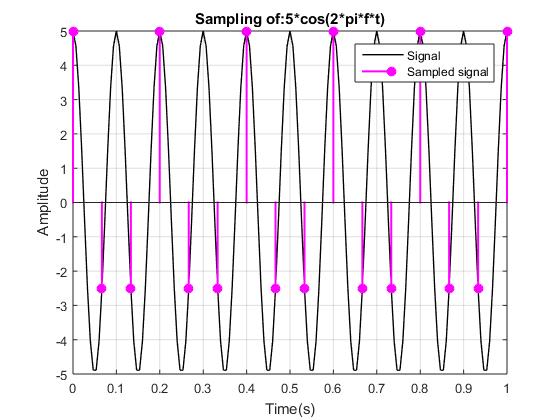


Figure 16\_Test\_Case\_4\_Sampler

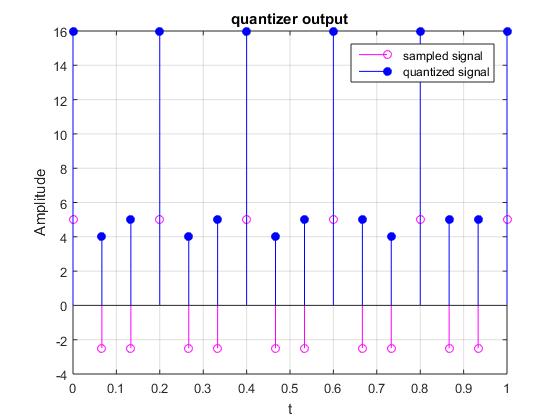


Figure 17\_Test\_Case\_4\_Quantizer

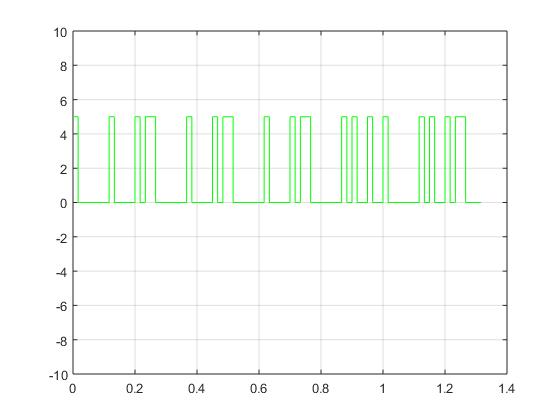


Figure 18\_Test\_Case\_4\_Encoder\_Unipolar

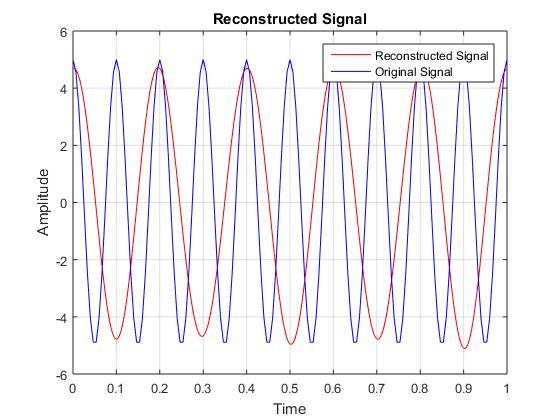


Figure 19\_Test\_Case\_4\_Resconstructed

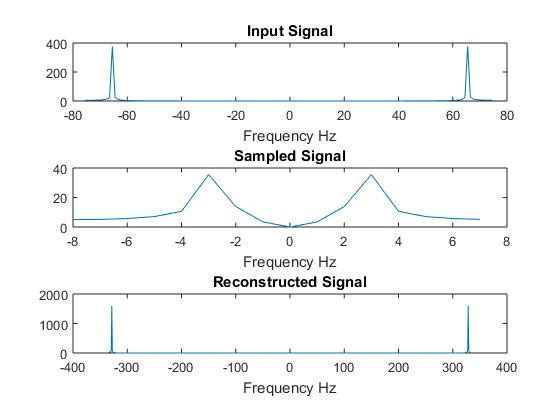


Figure 20\_Test\_Case\_4\_Combined

Comments:

* When fs=15 the signal cannot be reconstructed as fs < 2BW
* Aliasing occur.