



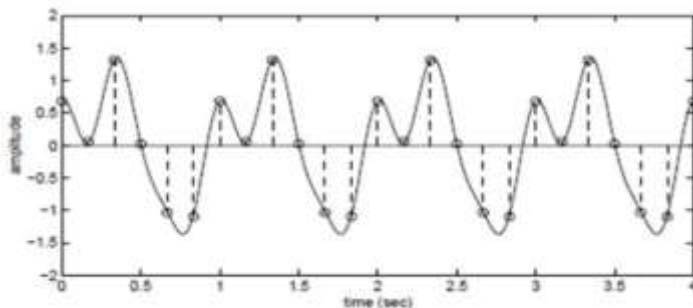
Q1) Choose the correct answer: -

- 1) In communication systems, as distance between transmitter and receiver increases:
 - a) Signal and noise power increase.
 - b) Signal and noise power decrease.
 - c) Signal power increases but noise power decreases.
 - d) Signal power decreases but noise power increases.

- 2) If a sinusoidal signal $m(t)$, with frequency f_0 Hz is sampled at f_0 Hz, the reconstructed (recovered) signal at the receiver will be:
 - a) DC signal.
 - b) $m(t)$ but with larger amplitude.
 - c) A sinusoidal signal with frequency $> f_0$.
 - d) A sinusoidal signal with frequency $< f_0$.

- 3) If the number of quantization levels used in an A/D conversion is 65,700, the minimum number of binary digits per sample is:
 - a) 15.
 - b) 16.
 - c) 17.
 - d) None of the above.

- 4) The signal shown in the figure is sampled at a 50% higher than the Nyquist rate. The approximate bandwidth B of the signal shown (in Hz) is:
 - a) 4.
 - b) 2.5.
 - c) 2.
 - d) 5.



- 5) Given the signal $m(t)$ band-limited to 300 Hz. If $m(t)$ is sampled at Nyquist rate, the cutoff frequency of the antialiasing filter is
- 150 Hz.
 - 300 Hz.
 - 600 Hz.
 - None of the above.
- 6) A signal $m(t)$ is sampled using Nyquist rate, then quantized into 128 levels. If the quantizer accepts 5 mV maximum amplitude, the maximum possible quantization error approximately equals:
- 0.039 mV.
 - 0.078 mV.
 - 0.156 mV.
 - 2.5 mV.
- 7) The signal $m(t) = \cos(200\pi t) + \cos(100\pi t)$ is to be sampled, quantized and digitally transmitted. For complete recovery of the signal $m(t)$, the following condition should be satisfied:
- $f_s \geq 200$ Hz.
 - $f_s > 100$ Hz.
 - $f_s \geq 50$ Hz.
 - $f_s > 50$ Hz.
- 8) Given an audio signal with bandwidth 3.5 kHz. If the signal is sampled at Nyquist rate and quantized using 512 levels, the data rate of the transmitted signal (in kbps) equals:
- 63.
 - 35.
 - 70.
 - 31.5.

Q2) Specify the Nyquist rate and the Nyquist interval for the following waveforms: -

- $m(t) = \text{sinc}(200t)$.
- $m(t) = \text{sinc}^2(200t)$.
- $m(t) = \text{sinc}(200t) + \text{sinc}^2(200t)$.

Q3) If an information analog waveform with a maximum frequency $f_m = 3\text{KHz}$, is to be transmitted over an L -ary PAM system where the level of the pulse levels is $L=16$.

- What is the minimum required sampling rate?
- What is the resultant bit transmission rate?

Q4) Write a MATLAB code to simply sample an analog information signal $m(t)$ at sampling frequency:-

- a) $f_s = 1.5 f_m$.
- b) $f_s = 2 f_m$.
- c) $f_s > 2 f_m$.

