Exam2

ⓘ This is a preview of the published version of the quiz

Started: Dec 9 at 7:31pm

Quiz Instructions

This exam is open book, open notes, you may use any online/hardback textbooks you like. You may use calculators and matlab, but may not collaborate with other people. All multiple choice and fill-in-the-blank answers should be within 5% of correct value.

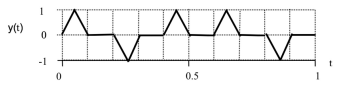
Unless stated otherwise in the question, use 2 decimal precision in fill-in-the blank questions, such as "132.31" or "58.02" for example. Also, canvas might force you to enter a leading "0" for numbers less than one, such as "0.11" and entries such as ".11" might be disallowed.

As always, make sure that you are in a location with good internet connectivity during the exam. It is not a bad idea to practice tethering through your cellphone as a backup to your regular internet access. Make sure your browser is compatible with canvas.

I may monitor my email tpweldon@uncc.edu (mailto:tpweldon@uncc.edu) during the exam, in case of some major urgent issue during the exam. Because the exam is online, most issues will have to wait until after the exam is completed, so do not expect any reply to any email, and **proceed on** with the exam even if you send an email.

Question 1

5 pts



For a binary polar line code with T_0=0.2 s, the first 4 bits of data are

- {1, 0, 1, 0}
- none above
- {1, 0, 1, 1}
- {1, 1, 0, 1}

Question 2

5 pts

For signal g(t)=cos(151π t) cos(397π t), to avoid aliasing the sample rate in samples/s must be greater than

Question 3

5 pts

A 12-bit ADC with voltage step Δv=8/10 V and sample rate 1000 samples/s has a maximum signal-to-noise ratio of quantization noise ratio of

Question 4

5 pts

If the autocorrelation of a signal is $R_g(\tau)=6\Pi\left(\frac{\tau}{2}\right)+7\Delta\left(\frac{\tau}{8}\right)$, then the signal power is P_g =

Question 5

5 pts

The instantaneous frequency in Hz of cos(5π t^4) at time t=1 is

Question 6

5 pts

For the PM signal g(t)=1cos(8000π t + 5 cos(17 t), the modulation index is β =

Question 7

5 pts

For the FM signal g(t)=cos(5000 t + 7 cos(195π t), the modulation frequency in Hz is f_m =

Question 8

5 pts

For the PM signal g(t)=6cos(8000π t + 0.8 cos(116 t), the peak frequency deviation in rad/s is $\Delta\omega$ =

Question 9

5 pts

For the PM signal g(t)=4cos(8000π t + 0.3 cos(20 t), the peak phase deviation in radians is $\Delta\phi$ =

Question 10

5 pts

For the PM signal g(t)=5cos(8000π t + 4 cos(11 t), the bandwidth in rad/s using Carson's rule is W =

Question 11

5 pts

Given a fixed rms noise voltage in a binary polar line code using a half-width rectangular pulse p(t), then in order to decrease the error rate from 0.3085 to 0.0062, thehow many dB would the peak pulse voltage need to increase?

- 9
- 14
- none above
- 26
- 12

Question 12

5 pts

For a 200 bit/s binary polar RZ line code using a half-width rectangular pulse, the magnitude of the power spectral density at the frequency f=400 Hz is $S(f)|_{f=400} = 0$.

- True
- False

Question 13

5 pts

An quaternary signal with a bit rate of 5,000 bits/s corresponds to a baud rate in symbols/s of

Question 14

5 pts

A duobinary sequence of {4, 0, 0, 0, -4} would correspond to a data sequence of

- {1, 0, 1, 1, 0}
- none above
- {1, 1, 1, 0, 0}
- {1, 0, 1, 0, 0}
- {1, 0, 1, 0, 1}

Question 15 5 pts

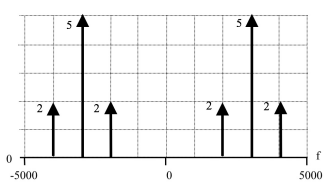
A duobinary pulse has zero ISI.

- True
- False

Question 16 5 pts

If a channel has a bandwidth of 4 kHz, and a signal power ratio of 8 milliwatts, and a noise power of 0.2 milliwatts, then the channel capacity in bits/s is C=

Question 17 25 pts



The following questions refer to the PM signal g(t)=Acos(θ(t)), with carrier frequency f_c, modulation frequency f_m, and magnitude |G(f)| as shown above.

NOTE: you must use dropdown menus below to answer **all parts** of this question.

Part 1: The carrier frequency f_c = [Select]

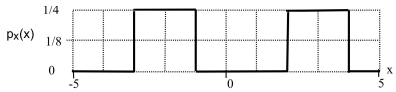
Part 2: The modulating frequency f_m = [Select]

Part 3: The modulation index β = [Select]

Part 4: The carrier amplitude A in the *time-domain* signal equation for g(t) equals [Select]

Part 5: The power in each sideband is how many dB below the carrier power? [Select]

Question 18 5 pts

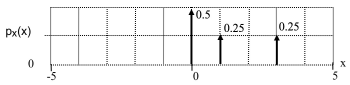


For random signal x with pdf $p_x(x)$ shown above, the expected value E[x] =

- -1
- -0.5
- 0
- none above
- 1.5
- 1
- 0.5
- -1.5

Question 19

5 pts



For random signal x with pdf $p_x(x)$ shown above, the second moment is $E[x^2]$ =

- 2.5
- 4
- 8
- 5
- none above
- 1

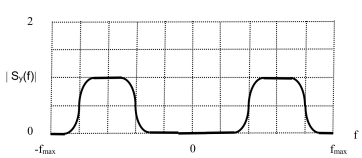
Question 20

5 pts

A random variable x has a gaussian pdf with mean μ_x = 2 andsecond moment of x is $E[x^2]$ =70. The standard deviation of x is σ_x =

Question 21

5 pts



Spectrum $|S_y(f)|$ above with fmax=4 kHz is for a DSB-SC carrier modulated by a binary polar line code using a raised-cosine pulse. The baud rate the system in symbols/s is

Quiz saved at 7:32pm

Submit Quiz