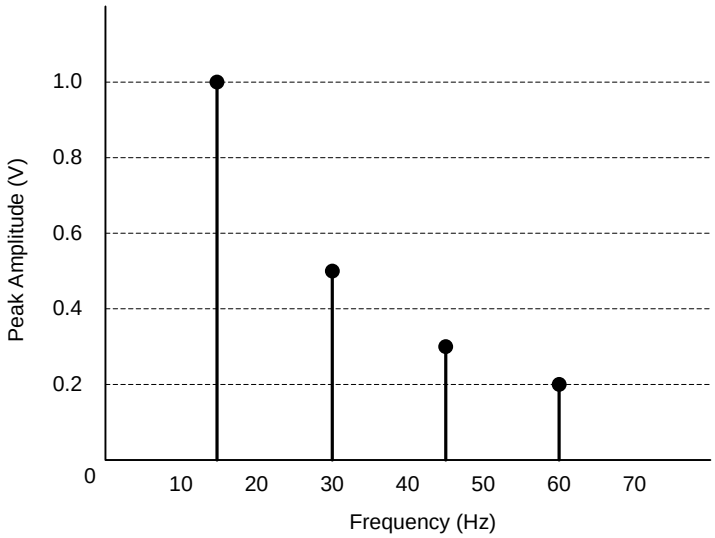
ITS 323 – QUIZ 2

First name: _____ Last name: _____

ID: _____ Total Marks: _____
out of 10

Question 1 [3 marks]

Below is a frequency domain plot of a communications signal *s(t)*.



a) What is the bandwidth of the signal *s(t)*? (½ mark) _____

b) What is the frequency of the signal *s(t)*? (½ mark) _____

c) Write a time domain equation for the signal *s(t)*? (1 mark)

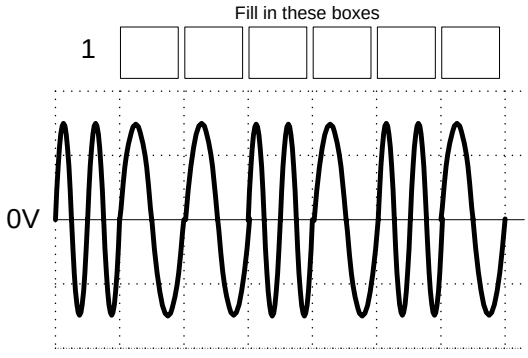
s(t) = _____

d) If using signal *s(t)*, two bits of information can be sent in one period, what is the maximum data rate? (1 mark)

_____

Question 2 [1.5 marks]

The following diagram shows part of a signal which modulates data using Binary Frequency Shift Keying. The vertical dashed lines show the transitions between each bit. Complete the boxes to show the data transmitted.



Question 3 [1 mark]

Consider a communications link with a bandwidth of 1MHz. If the received noise power is 20mW, what signal power would be required to be able to transmit at the maximum theoretical data rate of 4Mb/s?

Question 4 [2 marks]

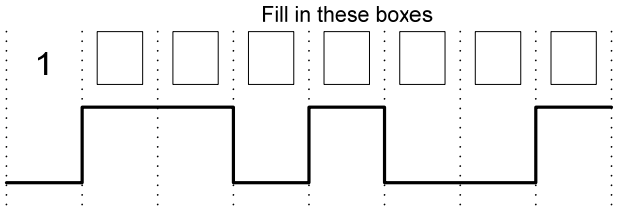
Assume you are using the free space loss equation to design a wireless link from one building to another (separated by 1km). The wireless receiver has a fixed receiver power threshold.

$$\frac{P_t}{P_r} = \frac{(4\pi d)^2}{G_t G_r \lambda^2} \text{ where } G = \frac{4\pi A}{\lambda^2}$$

After initial testing, although you have line-of-sight, you determine the received signal is two weak to communicate between buildings. List two approaches you can use to improve your design to a stronger link between buildings.

Question 5 [1.5 marks]

If the Non-Return-to-Zero Invert on ones (NRZI) encoding scheme is used, complete the bit pattern that the following signal represents. (That is, fill in the boxes).



Question 6 [1 mark]

a) A digital transmission scheme uses two signal elements to encode 3 bits of data. What is the data rate if the signalling rate is 1000 signals per second?

Answer: _____

b) True or false: Shielded Twister Pair is easier to install in buildings than UTP because the shielding makes the cable rigid (does not bend easily). True / False