ITS323 – Quiz 2

Name: _____

ID: _____   Mark: _____ (out of 10)

Question 1 [4 marks]

Consider a network with two links:

A ---------------------- B -------------------- C

link1   link2
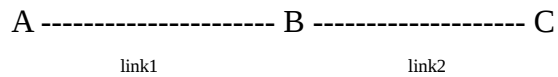
- Link 1: 24km, 20Mb/s

- Link 2: 12km

If a message of 2000 bits has to be sent from A to C with a maximum end-to-end delay of 430µs, then what is the minimum data rate required for link 2? You may assume no processing delays, and a queuing delay of 10µs at B. Also, the speed of light is 3×10^8 m/s. You must show calculations.

Question 2 [2 marks]

Consider the signal *s(t)*:

$$s(t)=105\sin(3\mathrm{x}10^4\pi t)+35\sin(9\mathrm{x}10^4\pi t)+21\sin(1.5\mathrm{x}10^5\pi t)+15\sin(2.1\mathrm{x}10^5\pi t)$$

    a) What is the period of the *s(t)*? [1 mark]

    b) What is the absolute bandwidth of *s(t)*? [1 mark]

Question 3 [4 marks]

An encoding scheme maps 4 bits of digital data into one signal element.

    a) In a noise-free channel with a bandwidth of 10MHz, what is the maximum theoretical data rate possible? [2 marks]

    b) Explain how can the data rate be increased, without increasing the bandwidth. [1 mark]

    c) What is a disadvantage of increasing the data rate with the approach you suggest in part (b)? [1 mark]