

This exam paper is for:

Extra Paper, A00123456

Each exam is equally difficult.
Answer your own exam.

Do not start until you are told to do so.

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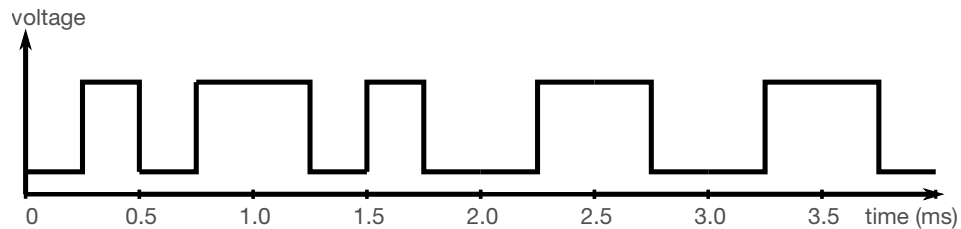
ELEX 3525 :Data Communications
Term 201310

MID-TERM EXAMINATION
8:30 – 9:20 AM
March 28 2013

This exam has four (4) questions. The marks for each question are as indicated. There are a total of 18 marks. Answer all questions. Write your answers in the exam book provided. Show your work. You may answer the questions in any order. Books, notes and calculators are allowed. You may keep this exam paper.
Show your work.

Question 1 (4 marks)

The diagram below shows a Manchester-encoded waveform using the line coding convention we used in the course.



- (a) what is the bit rate?
- (b) what is the baud rate?
- (c) what bits were transmitted?
- (d) if the bits were transmitted LS bit first, what ASCII character was transmitted?

Question 2 (2 marks)

A company would like to use unused AM radio channels to transmit data to its customers. These channels have a bandwidth of 9kHz. The company believes the signal-to-noise ratio at the receiver will be 10 dB. Do you think this company will be able to transmit data reliably (error-free) at a data rate of 100kb/s? Why or why not?

Question 3 (4 marks)

You are setting up a point-to-point wireless link and need to estimate if it will work. The transmitter transmits 100 mW of power at a frequency of 2.4 GHz. The transmit and receive antennas both have gains of 100 (20dB). To operate properly the received signal power must be at least $0.1 \mu\text{W}$ (-40dBm).

- (a) what is the wavelength?
- (b) what is the maximum distance over which this system will work?

Question 4 (8 marks)

You've been given with some unmarked co-ax transmission line and have been asked to find its characteristic impedance.

You measure that the propagation delay through 100 m of this cable and find it is $0.5 \mu\text{s}$. The diameter of the inner conductor is 1 mm and the diameter of the shield is 10 mm.

What is the:

- (a) velocity of propagation through the co-ax?
- (b) velocity factor?
- (c) dielectric constant?
- (d) characteristic impedance of this cable?