ELEX 4340 : Data Communications
Term 201530

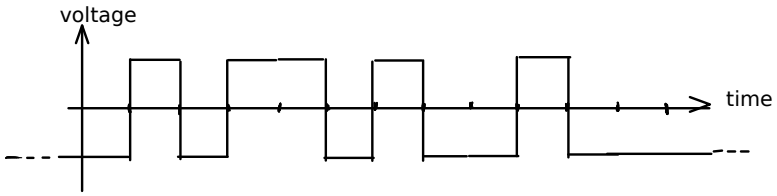
MID-TERM EXAMINATION
2:30 – 4:20 PM
November 30, 2015

This exam has five (5) questions on two (2) pages. The marks for each question are as indicated. There are a total of 19 marks. Answer all questions. Write your answers and all rough work in the exam book provided. Show your work. Draw a box around your final answer. Numerical answers must include units. You may answer the questions in any order. Books and notes are allowed. No electronic devices other than calculators are allowed. Take this exam paper with you when you leave.

Show your work.

Question 1 (4 marks)

The following diagram shows the waveform used to transmit a byte using an "RS-232" asynchronous serial interface:

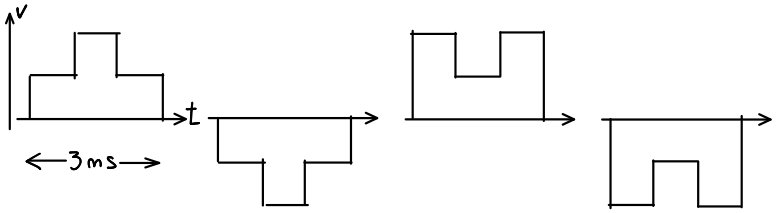


(a) Find the value of the transmitted byte in hexadecimal.

(b) Assuming 8 data bits per byte, what type of parity was used (none, even, odd or "can't tell")? Explain briefly.

Question 2 (4 marks)

A transmitter outputs one of the following four waveforms every 3 milliseconds:



What are the bit, symbol and baud rates?

Question 3 (4 marks)

A 50 kW FM broadcast transmitter operates at 100 MHz.

Assuming line-of-sight propagation and that both the transmitting or receiving antennas have a gain of 2 (3 dB), how much power is received by an antenna 10 km away from the transmitter?

Question 4 (4 marks)

A system measures the voltage of a battery and turns on a warning light when the measurement is less than 10 V.

However, the measurements are noisy and have a Gaussian distribution.

If the measurements have a mean of 12 V and a standard deviation of 1 V, what fraction of the time is the warning light on?

Question 5 (3 marks)

An amplifier is being tested for non-linear distortion using a single 1 kHz sine-wave as the input. (a) Is THD or IMD being measured? (b) Explain. (c) What frequencies would you expect to see in the output?