ELEX 3525 : Data Communications
Term 201510

MID-TERM EXAMINATION
10:30 – 11:20 AM
March 11, 2015

This exam has three (3) questions on one (1) page. The marks for each question are as indicated. There are a total of 10 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)

(a) What is the UTF-8 encoding of the first character of your surname (family name)[1]. Give your result in binary, using conventional (MS to LS) bit order.

(b) Draw the waveform that would be output by an "RS-232" serial interface to transmit this character at a bit rate of 600 bps using 7 data bits and even parity.

Label the time and voltage axes. Assume voltage levels of ± 5 V and indicate the duration of one bit on the time axis.

Question 2 (3 marks)

A channel adds Gaussian noise to a signal.

You've determined that a noise voltage of more than 3 volts causes an error.

You measure the RMS voltage of the noise and find it to be 1.8 volts.

You measure the average voltage of the noise and find it to be zero.

(a) What is the probability of error?

(b) Approximately how many errors would you expect in 10^5 bits?

Question 3 (3 marks)

You apply a signal with a level of +6 dBm to one end of a 100 m length of 50 Ω co-ax cable whose loss is specified as 3 dB per 100 m. What RMS voltage will you measure at the other end of the cable if it is terminated in its characteristic impedance (50 Ω)? Give your answer in millivolts.

---

[1]Your name is printed on the cover page.