ELEX 3525 : Data Communications
Term 201610

MID-TERM EXAMINATION
8:30 – 10:20 AM
March 30, 2016

This exam has five (5) questions on one (1) page. The marks for each question are as indicated. There are a total of 16 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 (3 marks)

You receive the two bytes, 0xd0 and 0xaf as part of a UTF-8 encoded sequence of characters. What is the Unicode code point of the character that was transmitted? Give your answer in hex.

Question 2 (3 marks)

A communication system transmits data using pulses of 16 different amplitudes. One pulse is transmitted every $2\,\mu$s. What are:

(a) the symbol rate,

(b) the bit rate, and

(c) the baud rate?

Question 3 (3 marks)

Draw the waveform that would be transmitted for the sequence of four bits "1010" when using a *differential* Manchester line code. Assume the encoding method described in the lectures is used and that the previous symbol contained a low-to-high transition. You do not need to label the time or voltage axes.

Question 4 (4 marks)

Your are using a 'scope probe with 2 meter long cable of 50 ohm co-ax. The shield and inner conductor diameters are 5 mm and 2.5 mm respectively.

(a) What is the dielectric constant of the dielectric?

(b) What is the propagation delay from one end of the cable to the other?

Question 5 (3 marks)

A communication system makes an error when the noise voltage is greater than 0.6 V. The noise has a Gaussian distribution with a DC voltage of 0 V and an RMS voltage of 200 mV. What is the error rate?