This exam paper is for:

Each exam is equally difficult.
Answer your own exam.

Do not start until you are told to do so.

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ELEX 4340 : Data Communications
Term 201430

MID-TERM EXAMINATION
11:30 – 12:20 AM
October 15, 2014

This exam has four (4) questions on one (1) page. The marks for each question are as indicated. There are a total of 15 marks. Answer all questions. Write your answers in the exam book provided. Show your work. 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. You may keep this exam paper.

Show your work.

Question 1 (3 marks)

Of the four types of transmission media we have studied in this course, which would be most appropriate for each of the following requirements:

(a) can fit many of them in a small conduit and are not affected by nearby sources of electromagnetic fields,

(b) allows communication with battery-powered robots moving products around a warehouse

(c) can carry power from a cellular radio transmitter at the bottom of a cell tower to an antenna at the top (assume a frequency of about 900 MHz).

Question 2 (4 marks)

"Open wire" transmission line is occasionally used for high-power signals. It consists of two wires separated by air. Compute the characteristic impedance of a transmission line composed of two 6-gauge wires whose centers are separated by 75 mm. (Hints: use the formula for twisted pair and the value of ε_r for free space).

Question 3 (5 marks)

Draw the RS-232 waveform required to transmit a byte with the value 0xAA. Assume a bit rate of 100 kb/s, 8 bits/character, even parity and one stop bit and levels of ± 2V.

Do these voltage levels conform to the RS-232 standard?

Question 4 (3 marks)

(a) A communication system transmits 3 bits/symbol and 1000 symbols/second over a channel. A checksum (overhead) of 6 symbols is added to each "packet" of 100 symbols. What is the throughput of this system in bits/second? Give your answer to four (4) significant digits.

(b) How many bytes are required for the UTF-8 encoding of the character "Latin Small Character Sharp S" that has a Unicode code point of U+00DF?

(c) Would it be more appropriate to use RS-232 or RS-422 with co-ax? With twisted-pair? *Briefly* explain why.