

Concordia University
Department of Electrical & Computer Engineering
ELEC 6831 – Digital Transmission Systems
Tuesday October 25, 2016
Dr. M.R. Soleymani
Duration: 120 minutes

You are allowed two 8.5*11 inch formula sheet. Anything may be written on this sheet. Non programmable calculators, pens, pencils and straightedges are also allowed.

If you have a difficulty you may try making REASONABLE assumptions. State the assumption and how that assumption limits your answer. Show all your work and justify all your answers. Marks are given for how an answer is arrived at not just the answer itself.

- 1) A quantity that has a mean of 20 and variance 4 is measured. What is the probability that the result of measurement is greater than 26? (2 Marks)
- 2) a) Find the matched filter for the signal shown in Figure 1 (2 Marks).
- b) Find the output of the matched filter (4 Marks).

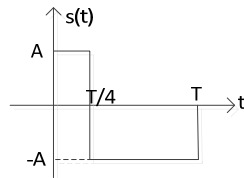


Figure 1

- 3) A digital communication system uses 8PSK with rolloff factor $\alpha = 0.1$ to transmit data at a rate of 2 Mbps.
 - a) Find the required bandwidth. (3 Marks)
 - b) Find the BER if the $\frac{E_b}{N_0} = 8$ dB. (3 Marks)
 - c) Assume that 16 QAM is used instead of 8PSK. Find the bit rate that can be supported using the same bandwidth as in part b) (1 Mark). Find the $\frac{E_b}{N_0}$ (1 Mark).
 - d) Find the BER for 16QAM in part c). (2 Marks)
- 4) The sequence 11000101001 is applied to the input of a DEPSK modulator.
 - a) Find the encoder output (1 Mark).
 - b) The decoder output if the third bit at the input of the decoder is detected erroneously (1 Mark).