King Fahd University of Petroleum and Minerals
College of Computer Sciences and Engineering
Department of Computer Engineering

COE 341 – Data & Computer Communications (T111)

Programming Assignment

Using ***MATLAB*** (or any other programming language), write a program to implement:

1. An *encoder* that accepts a binary data and produces the **graphical representation** of the equivalent digital signal using each of the following encoding techniques:
   a. NRZ-L
   b. NRZI
   c. Bipolar-AMI
   d. Pseudoternary
   e. Manchester
   f. Differential Manchester
   g. B8ZS
   h. HDB3

2. A *decoder* that accepts a digital signal as a sequence of +, –, and/or 0, and produces the equivalent binary data using each of the encoding techniques listed in part 1. If a portion of the digital signal is not valid for a particular encoding technique then an error message for that portion of the digital signal must be produced. For Manchester and Differential Manchester encodings assume that a '+' in the digital signal sequence refers to a positive pulse at the beginning of the bit and a transition at the middle of the bit, and that a '–' in the digital signal sequence refers to a negative pulse at the beginning of the bit and a transition at the middle of the bit.

Assume the following:

1. The last pulse before the start of the program is *negative*.
2. The total number of 1s before the start of the program is *odd*.
3. The program expects any length for the input (i.e. the input length is NOT fixed).

Send your thoroughly commented source code and the results of your program to both marwan@.kfupm.edu.sa and a.abusaadah@gmail.com by ***Tuesday 29/11/2011 at Midnight***. Use the following sample input to produce the results of your program:

1. Part 1: `1001100000000000011111000000101010101`
2. Part 2:
   a. `+++–++---–+-–++–+–+–+–`
   b. `+00–000+–+–+–0+0–0+00–+–000`
   c. `+00–000–+0+–+–0+0–0+00+–000`
   d. ` 000–+00+0–+-00+–00–+000+-00–+-+-`
   e. `+00–000-+0+–0+0–0+00–+–0`