Department of Communications and Computer Engineering
CCE5223 - Speech Processing and Coding

Tutorial 3
Speech Coding

1. Consider the difference between waveform coders and source coders.
   (a) Describe one system of EACH type used for speech
   (b) Describe two techniques to lower the bit rate using waveform coders, explaining how the bit rate can be reduced without reducing speech quality
   (c) Why is speech quality lower with source coders?
   (d) How does vector quantisation allow lower bit rates without quality loss?

2, In low bit-rate vocoders the trade-offs include: the number of parameters to transmit, how often to transmit them, and how many bits to assign to each parameter.
   (a) Describe a vocoder system giving reasonable values used and hence explain the degradations that occur in output speech as each of these parameters is reduced in turn (ie fewer parameters, less often, or fewer bits per parameter).

3. Why is a codebook necessary in LPC systems. Describe an algorithm suitable to generate a codebook.

4, Distinguish between an excitation codebook and an error codebook.

5. Sketch a diagram for the source-filter model analysis and synthesis systems, relating the model to the articulatory system, and mention the approximations of the model to the actual systems.

6. Describe the autocorrelation method to obtain the LPC parameters. Relate the alpha LPC parameters to the PARCOR coefficients, the reflection coefficients, and the cepstral coefficients.