S-89.3610 Speech Processing

Exam 2.12.2013/ukl

1.

a) Define: phoneme, allophone, nasal ja formant (2p).
b) What means coarticulation, in which subfields of speech processing this phenomenon causes problems and why? (2p)
c) Speech coding is mainly based on certain properties of speech signal. What properties? (2p)

2. Basic anatomy of the ear. Functional properties of different parts. Masking in frequency and time. How these can be measured. (6p).

3. Describe the basic principles of linear prediction (LP) by using equations. What are the starting points and the goals of the method? What are the main steps when solving LP-coefficients?
What are the basic differences between autocorrelation and covariance methods? In which situation is the difference small and why?
What are the connections between the LP modeling and the source-filter theory?
How does the prediction error signal look like in the time and frequency domain in the case of vowel sounds? How is the prediction error signal computed?
What means pre-emphasis? Why it is used?
How is the order of the predictor typically chosen? (7p)

4. What are the basic speech signal elements used in different kind of speech synthesizers. Classify and explain these different methods. What means high- and low-level synthesis? (5p)

(Answer all four questions, Max 24p)