Printed Pages : 3

EEC067

(Following Paper ID and Roll No. to be filled in your Answer Book)

PAPER ID : 121852

Roll No.

B.Tech.

(SEM. VIII) THEORY EXAMINATION, 2014-15

SPEECH PROCESSING

Time : **3** Hours] [Total Marks : **100**

1 Attempt **any four** parts **5×4=20**

(a) List out the various applications of the LPC parameters.

(b) Compare prediction error and normalized mean square error. Explain them.

(c) State the basic principles of the Linear Predictive Coding analyses.

(d) How will you synthesis the speech from linear predictive parameters? Explain.

(e) Enlist the various types of speech parameters and also discuss about the relation between the various speech parameters.

(f) Write short notes on the autocorrelation method. Mention its significance.

2 Attempt **any two** parts **10×2=20**

(a) With the help of a neat diagram, explain the mechanism of speech production and acoustic phonetics.

(b) Compare the lossless tube model and digital models for speech signals. Explain them.

(c) Write a note on acoustic theory of speech production.

3 Attempt **any two** parts **10×2=20**

(a) From the basic principles of sampling rates in time and frequency, prove that the total sampling rate of $X_n(e^{j\omega})$ is given by the $2CF_S$ where 2C is the over sampling ratio.

(b) How will you estimate pitch period using autocorrelation function. Explain it in detail.

(c) From the basic equation for auto-correlation function of a discrete-time deterministic signal $\varphi(k)$, derive the equation for short time auto-correlation function $R_n(k)$. Draw the related block diagram so as to obtain $R_n(k)$ from the sequence x(n).

4 Attempt **any two** parts **10×2=20**

(a) Implement the filter bank summation method using FFT. Explain it with an example.

(b) Define short time Fourier analysis and also explain the properties of it.

(c) Illustrate about the following terms:

(i) Pitch detection

(ii) Vocoder and channel vocoder.

5 Attempt **any two** parts **10×2=20**

(a) Discuss the operation of the simple pitch period estimators, with related block diagram and waveforms/samples.

(b) Specify the importance of homomorphic vocoder. Explain it in detail.

(c) Define convolution. Write in detail about the Homomorphic speech processing system.