

Printed Pages : 3



EEC067

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

PAPER ID : 121852

Roll No.

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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 $\phi(k)$, 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.
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