

Total No. of Questions : 10]

SEAT No. :

P4940

[Total No. of Pages :3

[4959]-1094

B.E. (E & TC)

SPEECH AND AUDIO SIGNAL PROCESSING

(2012 Pattern)

Time : 2 ½ Hours]

[Maximum Marks : 70

Instructions to the candidates:

- 1) *Q.1, OR Q.2, Q.3 OR Q.4 , Q.5.OR Q.6, Q.7 OR Q.8, Q.9 OR Q.10.*
- 2) *Right side figures indicate marks*
- 3) *Assume suitable data, if necessary.*

Q1) a) Explain in detail autocorrelation method for computing Linear Predictor Coefficients **[6]**

b) What is Pitch of speech signal? Explain any one method for computation of pitch of the speech signal? **[4]**

OR

Q2) a) Explain LTI model of speech production. **[5]**

b) Explain the concept of critical band and auditory systems as a filter bank? **[5]**

Q3) a) What is spectrogram? What are their types? Explain its significance and applications in speech processing **[5]**

b) Explain the concept of **[5]**

i) Spectral flux.

ii) Spectral roll-off

OR

P.T.O.

Q4) a) How Short time energy, short time average magnitude short time average zero crossing rate is useful in speech processing? [4]

b) Explain the concept of [6]

i) Spectral Centroid

ii) Spectral spread

iii) spectral entropy

Q5) a) Explain basic principal of Linear Predictive Analysis? Explain autocorrelation method for formant analysis [8]

b) Explain the Covariance method for computing Linear Predictor Coefficients. [8]

OR

Q6) a) Explain covariance method for Linear Predictive Analysis? [8]

b) Explain Durbin algorithm in LPC analysis. [8]

Q7) a) What is homomorphic processing? with reference to speech processing. How it is useful for speech analysis.? [8]

b) Explain in detail estimation of formant and pitch parameters using cepstrum [8]

OR

Q8) a) What is cepstrum? Explain in detail computation of Mel Frequency Cepstral Coefficients (MFCC). [8]

b) What is long term complex cepstrum? What is short term complex cepstrum? Explain the properties of the complex cepstrum. [8]

Q9) a) Explain in detail automatic speech recognition system with suitable example (e.g. automatic telephone dialling system) [9]

b) What is the difference between speaker identification and speaker verification? What are the features used for speaker recognition/verification system and how? [9]

OR

Q10)a) What is dynamic time warping? Explain with suitable example. [4]

b) Explain speech enhancement using comb filter and spectral subtraction method. [10]

c) What are the various methods used for TTS. [4]

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