[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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