

B.TECH
(SEM VIII) THEORY EXAMINATION 2018-19
SPEECH PROCESSING

Time: 3 Hours

Total Marks: 100

Note: 1. Attempt all Sections. If require any missing data; then choose suitably.

SECTION - A

1. Attempt *all* questions in brief. 2x10=20
- a. What are lossless tube models of speech signal?
 - b. Explain digital model of speech production.
 - c. What is short term average zero crossing rate?
 - d. Write short note on speech spectrogram.
 - e. Explain one application of vocoders in short.
 - f. What is the role of cepstrum in speech processing?
 - g. Explain autocorrelation method of LPC.
 - h. Write down one application of digital speech processing.
 - i. Differentiate between speech and silence.
 - j. Explain acoustic phonetics with proper example.

SECTION - B

2. Attempt any *three* of the following: 10x3=30
- a. Explain in detail the mechanics of speech production and acoustic phonics.
 - b. What is pitch period estimation using parallel processing explain with proper equations.
 - c. How do we implements filter banks using FFT algorithms?
 - d. Multipulse LPC uses an excitation with several pulses per pitch period. Explain how this can improve LPC quality.
 - e. Explain pitch detection using Homomorphic processing technique.

SECTION - C

3. Attempt any *one* part of the following: 10x1=10
- (a) What is time dependent processing of speech gives at least one application?
 - (b) Why we need speech processing in real world explains with example.
4. Attempt any *one* part of the following: 10x1=10
- (a) Write short note on
 - i). Short time energy
 - ii). Average magnitude
 - (b) Explain complete model of auditory processing with figures and examples.
5. Attempt any *one* part of the following: 10x1 =10
- (a) Define and proof different properties of short time Fourier transform.
 - (b) What is channel vocoders explain it's working with proper diagrams.
6. Attempt any *one* part of the following: 10x1=10
- (a) The signal $z(t)$ is corrupted by a single echo to become $y(t) = x(t) + ax(t - \tau)$. Show that the log power spectrum of y is approximately that of x with an additional ripple. Find the parameters of this ripple.
 - (b) What is homomorphic system of convolution explain in detail.
7. Attempt any *one* part of the following: 10x1=10
- (a) Show that the open-loop prediction results in large error because the quantization error is multiplied by the prediction gain. Show that with closed-loop prediction this does not occur.
 - (b) How do we compute the gain for a given model explain.