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Total No. of Pages : 02

Total No. of Questions : 18

B.Tech. (ECE) (Sem.-5)

**SPEECH AND AUDIO PROCESSING**

Subject Code : BTEC-905E-18

M.Code : 78711

Time : 3 Hrs.

Max. Marks : 60

**INSTRUCTIONS TO CANDIDATES :**

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.
3. SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.

**SECTION-A****Write briefly :**

- 1) Define spectrogram? Explain why wideband spectrograms show periodicity in time?
- 2) Define Linear Predictive Coding (LPC).
- 3) What are the main differences between speech coding standard ITU-T G.726 and G.728 and G.729?
- 4) Define moving average prediction.
- 5) Define the term liftering, quefrency and cepstrum.
- 6) Why LPC transformation is required? Write the names of major types of LPC transformation.
- 7) Write the expression of logarithm quantizer and its advantages over uniform quantizer.
- 8) Write any two types of time domain pitch detection algorithms (PDAs) and their key features.
- 9) What is Waveform approximating speech coding technique?
- 10) What is the difference between Codebook Excitation and self-excitation?



**SECTION-B**

- 11) With the help of suitable diagrams, explain in detail the Human Auditory System.
- 12) How linear predictive coding used in speech production. Explain in detail the Covariance methods for LPC analysis.
- 13) Explain how pitch is estimated using cepstrum analysis?
- 14) Explain following Excitation codebook search method:
  - a) State-save method
  - b) Zero input zero output method
- 15) Explain levinson-Durbin algorithm for calculation of prediction coefficients.

**SECTION-C**

- 16) With the help of proper block diagram and mathematical expressions, explain forward and backward adaptive quantizer.
- 17) How is code book generated for CELP? What are the limitations of CELP? What are the modifications suggested in the basic CELP coder?
- 18) Explain LPC to LSF and LSF to LPC Transformation in detail with proper mathematical expressions.

**NOTE : Disclosure of Identity by writing Mobile No. or Making of passing request on any page of Answer Sheet will lead to UMC against the Student.**