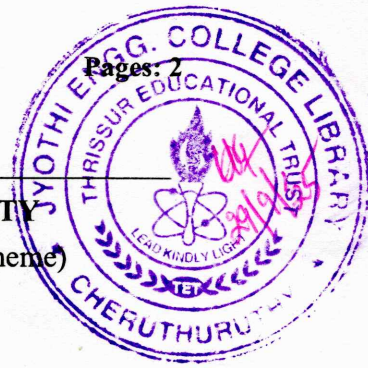C   **0400ECT456042501**   Pages: 2

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APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

B.Tech Degree S8 (S) Examination September 2025 (2019 Scheme)

Course Code: ECT456
Course Name: SPEECH AND AUDIO PROCESSING

Max. Marks: 100   **Duration: 3 Hours**

PART A
Answer all questions, each carries 3 marks.   Marks

1   Differentiate between voiced and unvoiced speech.   (3)

2   How do the articulators contribute to the production and clarity of speech?   (3)

3   What is a spectrogram of a speech signal, and how does it represent the characteristics of speech?   (3)

4   What is speech enhancement, and what are the four main categories of methods used to improve speech quality?   (3)

5   What are critical bands?   (3)

6   Define frequency masking. What is the cause of Frequency Masking?   (3)

7   Why do we need to compress audio files?   (3)

8   Define pre echo effect in MPEG AAC coder? How is it suppressed?   (3)

9   What are acoustic cues, and how are they categorized?   (3)

10   Distinguish between monoraul, stereo and multi channel audio.   (3)

PART B
Answer any one full question from each module, each carries 14 marks.

Module I

11   a)   Explain the linear prediction model for speech signals and describe the process of estimating predictor coefficients using the autocorrelation method.   (10)

     b)   Define Linear Predictive Coding (LPC) and discuss its applications in speech analysis   (4)

OR

12   Describe the short-term analysis of speech signals in terms of time-domain parameters.   (14)

Module II

13   Explain language identification system with the help of block diagram   (14)

OR

14 How are Mel Frequency Cepstral Coefficients (MFCC) computed? Illustrate the process with a block diagram. (14)

Module III

15 Describe the basic anatomy of the human hearing system with the help of a clear diagram (14)

OR

16 Explain the MPEG psychoacoustic model and its role in audio compression (14)

Module IV

17 a) How is transform coding applied in speech compression, and what are its benefits? (10)

  b) How are different MPEG audio coding standards utilized in audio compression and streaming applications? (4)

OR

18 How does the MPEG-2 AAC (Advanced Audio Coding) standard enhance audio compression and quality? (14)

Module V

19 What are the subjective evaluation methods for assessing audio quality? Describe one method in detail. (14)

OR

20 Explain PEAQ method of audio quality analysis. (14)

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