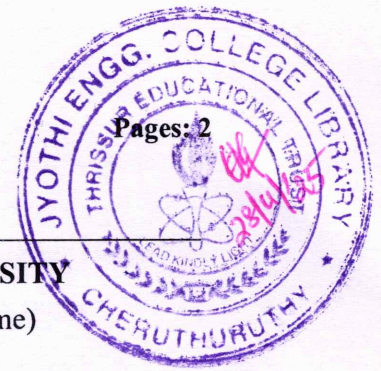C   **0400ECT456042502**   Pages: 2

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APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

B.Tech Degree S8 (R,S) Exam April 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	What is short-time speech analysis, and why is it significant in the field of speech signal processing?	(3)
2	Define short term energy and magnitude.	(3)
3	Distinguish between wideband and narrowband spectrogram.	(3)
4	What is speech enhancement, and explain the subtraction and filtering out in speech enhancement.	(3)
5	What is the cause of frequency masking?	(3)
6	How does the basilar membrane act as a filter bank?	(3)
7	What is transform coding in audio compression?	(3)
8	Define redundancy removal in audio compression and discuss its importance.	(3)
9	Differentiate between Binaural spatial audio and multichannel audio	(3)
10	What is MUSHRA?	(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 derive the equation for short-average prediction error in LPC analysis	(10)
	b)	Explain the principle of Linear Predictive Coding (LPC).	(4)

OR

60

12   Explain the short time processing of speech signals. Also define the terms :   (14)
Short time Average Zero Crossing Rate (ZC rate), Auto Correlation Function (ACF).

Module II

13   Explain speaker verification system with the help of block diagram   (14)

OR

14 a) Explain the Cepstral analysis technique for analyzing speech with help of block   (10)
diagram.

    b) Explain how formant estimation is performed using cepstral analysis.   (4)

Module III

15   Explain the fundamental structure of the human auditory system and illustrate it   (14)
with a detailed diagram.

OR

16   Describe the MPEG psychoacoustic model and how it contributes to audio   (14)
compression.

Module IV

17   Explain the Modified Discrete Cosine Transform (MDCT) used in MPEG AAC?   (14)

OR

18   Explain the MPEG-2 AAC (Advanced Audio Coding) standard.   (14)

Module V

19   Explain the differences between Monaural, Binaural and Multichannel Surround   (14)
systems with necessary figures.

OR

20   Explain an objective method for analyzing audio quality.   (14)

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