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Reg No.:_____ Name:_____

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

Eighth Semester B.Tech Degree Supplementary Examination October 2023 (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		Discuss about the articulators in the creation of speech.	(3)
2		Explain short-time autocorrelation function and mention its applications.	(3)
3		Explain how formants are estimated using cepstral analysis of speech.	(3)
4		Explain the parametric resynthesis method for speech enhancement.	(3)
5		Compare forward masking and backward masking of speech signals.	(3)
6		Explain the concept of auditory or hearing threshold with the help of a neat diagram.	(3)
7		Distinguish between statistical redundancies and perceptual irrelevancies.	(3)
8		Explain the relation between sampling rate and quality of digital audio.	(3)
9		What is interaural level difference and what causes it?	(3)
10		Distinguish between monaural and stereo sound.	(3)

PART B

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

Module I

11	a)	Explain the basic principle of LPC analysis.	(4)
	b)	Discuss about linear prediction model of speech signal and explain how the predictor coefficients are estimated using autocorrelation method.	(10)

OR

12	a)	Explain the significance of short-term speech analysis.	(6)
	b)	Explain how short-time energy and short-time zero-crossing rate can be the basis for an algorithm for making a decision as to whether the speech signal is voiced or unvoiced.	(8)

Module II

13	a)	Explain the basic principles of cepstral analysis of speech signals.	(7)

b) What is speech enhancement? What are the different objectives of speech enhancement? (7)

OR

14 a) Explain the speech recognition system with the help of a block diagram. (8)

b) Discuss about waveform coding, vocoding and hybrid coding. (6)

Module III

15 Describe the sequence of events leading to auditory nerve spiking when an acoustic pressure wave appears on the outer ear. (14)

OR

16 a) Explain how the psychoacoustic model sets the threshold in audio coding systems. (9)

b) Explain the concept of critical band structure in audio perception. (5)

Module IV

17 a) Describe the pre echo effect in AAC coders and a method to control this effect. (7)

b) Explain any one lossless audio coding technique. (7)

OR

18 a) Explain the Modified Discrete Cosine Transform (MDCT) and its properties, used in MPEG AAC. (8)

b) Explain the basic concept behind transform coding. (6)

Module V

19 a) Discuss about Mean opinion score (MOS Score). (7)

b) Explain MUSHRA score for audio quality analysis. (7)

OR

20 a) Explain any two spatial audio standards. (7)

b) Explain Perceptual evaluation of audio quality (PEAQ) with the help of a block diagram. What are the different versions of PEAQ? (7)

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