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APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

B.Tech Degree S8 (S,FE) Examinations September 2026 (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	Define the short-time autocorrelation function and discuss its areas of application.	(3)
2	Differentiate between voiced and unvoiced speech.	(3)
3	Define speech enhancement and explain the subtraction and filtering techniques used in the process.	(3)
4	What is a spectrogram in the context of a speech signal? Explain its purpose.	(3)
5	What leads to the phenomenon of frequency masking?	(3)
6	What is the role of outer ear in hearing?	(3)
7	What is redundancy removal in audio compression, and why is it important?	(3)
8	Explain the sampling rate and bandwidth required for digital audio (CD audio)?	(3)
9	Differentiate between Binaural spatial audio and multichannel audio.	(3)
10	Explain the subjective audio quality analysis technique.	(3)

PART B

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

Module I

11 Explain the source-filter theory of speech production with necessary diagrams. (14)

OR

12 Discuss three time domain analysis techniques commonly used in speech processing: short-time energy, short time magnitude and short-time zero crossing rate. (14)

Module II

13 Draw and explain the basic structure of a speaker verification system, highlighting the key components and their purposes. (14)

OR

14 Explain the spectral subtraction method of speech enhancement with block diagram. (14)

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 Describe the concepts of transparent and perceptual audio coding and how they help reduce the size of audio data. (14)

Module IV

17 Explain transform coding. (14)

OR

18 Explain MPEG 2 AAC (Advanced Audio Coding) standard ? (14)

Module V

19 Describe the Perceptual Evaluation of Audio Quality (PEAQ) method using a block diagram. What versions of PEAQ are available? (14)

OR

20 Explain any two spatial audio standards. (14)

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