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**Presidency University**

**Bengaluru**

 **SCHOOL OF ENGINEERING**

**Make up Examinations, july- 2024**

**Date**: 10/July/2024

**Time**: :00am – 00:00pm

**Max Marks**: 100

**Weightage**: 50%

**Odd Semester**: V

**Course Code**: ECE3028

**Course Name**: SPEECH SIGNAL PROCESSING

**Department:** ECE

 **Instructions:**

1. *Read the all questions carefully and answer accordingly.*
2. *Do not write any matter on the question paper other than roll number.*

**PART A**

**Answer any SIX Questions. Each question carries 10 marks. (6Qx 10M= 60M)**

1. Speech processing is the study of speech signals and the processing methods of signals. Why signals are usually processed in a digital representation?

(CO:1 BL: Knowledge)

1. The data sets involved in speech processing applications are very large and, as such, they require huge memory and high-speed processing algorithms. Write some applications of speech signal processing with suitable diagrams.

 (CO:1 BL: Knowledge)

1. Noise cancellation, a speech enhancement algorithm eliminates background noise and improves speech signal intelligibility and quality of speech. Write a brief about short time energy.

 (CO:2 BL: Comprehension)

1. The spectral-based pitch detection algorithm is based on autocorrelation and the cepstral method.  Write a brief about short time magnitude.

 (CO:2 BL: Comprehension)

1. The most typical format for storing sound signals is the wav-file format. Explain short time Fourier analysis using DFT interpretation.

(CO:3 BL: Comprehension)

1. Speech features are often **vector-valued.** Explain short time Fourier analysis using DTFT interpretation.

(CO:3 BL: Comprehension)

1. Filters are used to pass the desired frequency signals and rejects undesired frequency signal. Determine the complex cepstrum of the decaying exponential sequence, $a^{n}u\left(n\right), \left|a\right|<1$.

(CO:4 BL: Application)

1. One of the applications of speech enhancement algorithm is noise reduction. Explain how to compute the short time cepstrum analysis using DTFT.

 (CO:4 BL: Comprehension)

**PART B**

**Answer any TWO Questions. Each question carries 20 marks. (2Qx 20M= 40M)**

1. The study of the abstract units and their relationships in a language is called**phonemics. List the properties of speech and explain the speech waveform using voiced, unvoiced and silence speech classifications.**

 (CO:1 BL: Comprehension)

1. A milestone in speech processing was the development of the vocoder, or voice coder, by Homor Dudley in 1939. Write in detail about pitch period estimation and parallel processing algorithm.

 (CO:2 BL: Comprehension)

1. The STFT is a mathematical and computational tool for representing the speech signal. Explain filter bank summation method for short time analysis with suitable diagrams.

 (CO:3 BL: Comprehension)