THEJUS ENGINEERING COLLEGE

VELLARAKKAD P.O, THRISSUR-680584

Name: .....

Reg No:.....

FIRST SERIES TEST

BRANCH: Electronics & Communication Engineering **SEMESTER: VIII**

SUBJECT: ECT456 Speech and Audio Processing **MONTH & YEAR: March 2023**

Time: 1 ½ hrs **Max. Marks: 50**

PART A

Answer all questions. Each question carries 3 marks

1. What is Zero Crossing Rate (ZCR) ? How is it used for differentiating voiced and unvoiced speech?
2. Why is short time analysis preferred for analyzing speech signals?
3. What is the need for Spectrogram representation of speech signals?
4. What are the applications of STFT?
5. Define Cepstrum with an equation.
6. What are the objectives of speech coding?

PART B

Answer any two full questions. Each question carries 16 marks

7. a) Write mathematical expressions for the computation of short time energy for a speech segment. **(8 marks)**

   b) Explain filter bank view of STFT analysis. **(8 marks)**

8. a) Describe with the help of a block diagram the steps involved in obtaining MFCC coefficients of a speech signal. **(8 marks)**

   b) Describe human speech production mechanism using a diagram and the role of the following organs in speech production (i) Velum (ii) Vocal folds (iii) Lips (iv) Tongue **(8 marks)**

9. a) Explain any one speech coding technique in detail. **(8 marks)**

   b) Draw the source system model of speech production. Derive equations of LP analysis using the autocorrelation method. **(8 marks)**

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SECOND SERIES TEST

BRANCH: Electronics & Communication Engineering **SEMESTER: VIII**

SUBJECT: ECT456 Speech and Audio Processing **MONTH & YEAR: May 2023**

Time: 1 ½ hrs **Max. Marks: 50**

PART A
Answer all questions. Each question carries 3 marks

1. Explain the concept of Masking.
2. What is meant by Critical Bandwidth?
3. Write a short note on the tonotopic behavior of the basilar membrane.
4. Explain redundancy removal in an audio signal.
5. Briefly explain the concept of MDCT mathematically.
6. Name any three lossless coding methods.

PART B
Answer any two full questions. Each question carries 16 marks

7. a) Explain about Sampling rate and bandwidth requirement for digital audio. **(8 marks)**
   b)With the help of a neat diagram explain the anatomy of the hearing system **(8 marks)**
8. a) Explain the MPEG2-AAC coding standard. **(8 marks)**
   b) Differentiate between simultaneous masking and temporal masking. **(8 marks)**

9. a) Draw and explain the concept of auditory filter banks. **(8 marks)**
   b) Explain Pre-echo and pre-echo suppression. **(8 marks)**

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