

Speech Signal Processing

Assignment 3

Course Code **EC5.408**

Max. points **25**

Note:

- Always cite your sources (be it images, papers or existing libraries). Follow proper citation guidelines
- Unless specifically permitted, collaborations are not allowed.
- Do not copy or plagiarise, if you're caught for plagiarism or copying, penalties are much higher (including an **F** grade in the course) than simply omitting that question.
- Need to mention clearly if any assumptions are being considered.
- No late submissions are accepted.

Syntax to be followed for submission

- A single zip folder has to be uploaded in the moodle, which should contain the snapshots of your Numericals, observations to be saved in a pdf format and computer based questions (code) should be placed in the respective folder. And the name of the zip file should strictly be **EC5_408_A3_RollNo.zip**

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- For this assignment you can use either *Python* or *Matlab* which ever your are comfortable.

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1. Record a vowel utterance of your choice and perform the following operations:

Note: Computer Based Question

- i Compute the short term autocorrelation function for a hamming window of $N=512$ and plot . **(2 Points)**
 - ii Compute the $N=512$ point magnitude spectrum of the waveform based on hamming window and STFT and plot magnitude spectrum **(2 Points)**.
 - iii Comment the changes in both the autocorrelation and the spectrum. What do these changes indicate about the effects of the clipping operations on the waveform? **(3 Points)**
 - iv Estimate the pitch using the two autocorrelation results. Which result would provide better performance in an autocorrelation procedure? **(3 Points)**
2. Record your name and Compute MFCC, and take first 13 coefficients of each frame and plot it. Comment on the plots. **Note: Computer Based Question (5 Points)**
 3. Consider a voiced and unvoiced sound and plot spectrogram of it. Comment on the formant structures. **Note: Computer Based Question (5 Points)**
 4. The Question which has been mentioned in the CLASS by Anil Sir. **(5 Points)**
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