Speech Signal Processing

Assignment 2 — Course Code **ECE448**

Max. points **20**

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 as $ECE448\_A2\_ < RollNo. > .pdf$ and computer based questions (code) should be placed in a folder and named it as $ECE448\_A2\_cbq$
- For computer based questions you are expected to submit Codes (Matlab/Python)

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1. Record your name and the utterance should be "I am <yourname>". **Note: Computer Based Question**

   (a) Create a time-domain plot and mark voice and unvoiced regions. **(1.5 pts)**

   (b) Select a segment from a wave file and identify whether the selected region is voiced or unvoiced.

   i. Zero crossing **(1 pts)**

   ii. Energy **(1 pts)**

   iii. Autocorrelation **(1 pts)**

   Comment on each **(1.5 pts)**

2. What are epochs in speech production? Why are they significant in speech signal processing? Illustrate with an example. **(4 pts)**

3. Load the files H _ MKB.wav into MATLAB/Python using the function wavread/audioread. *Audio file is shared along with the assignment.* **Note: Computer Based Question**

   (a) Create a time-domain plot with voiced and unvoiced regions marked **(1.5 pts)**

   (b) In the time-domain plot, mark the regions where the pitch is the highest and the lowest. What are the pitch frequencies in those regions? **(1.5 pts)**

   (c) What is the fundamental frequency (pitch) in your particular case? **(1 pts)**

(d) Identify a voiced regions and unvoiced regions in a signal and for one particular frame, compute of frame energy and comment of it. **(2 pts)**

(e) Implement zero-crossings and comment of it.**(2 pts)**

(f) Autocorrelation and comment of it.**(2 pts)**
