b) Define voiced and unvoiced speech signal? How voiced and unvoiced speech can be detected. 5+5

4. a) What are the different parts of a Human Ear and mentions their purpose.b)Why Do We Have Two Ears? Explain. 6+4

5. a) What is Acoustic Intensity? Explain threshold of hearing in human.

b) What is spectrogram? Explain its significance and applications in speech processing 4+6

6. Write short notes on:

i) Short time energy

ii) Short time average magnitude

iii) Short time zero crossing rate

iv) Short time autocorrelation

v) Short time average magnitude difference 5*2

7. a) What is speech enhancement? Explain the spectral subtraction method of speech enhancement technique in detail.

b) Explain how Speech and Silence region are discriminated using Short time Energy and Zero crossing rate. 5+5

8. a) What is the diference between speaker identification and speaker verification?

b) Explain the basic principles of Liner Predictive Coding (LPC). 5+5

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B.Tech Even Semester Examination, May, 2025

Electronics & Communication Engineering

(6th Semester)

Course No: ECC-607B

(Speech and Audio Processing)

Full Marks: 50

Pass Marks: 25

Time: 2 hours

Note:

1. Attempt any five questions.
2. Begin each answer in a new page
3. Answer parts of a question at a place
4. Assume reasonable data wherever required
5. The figure in the right margin indicates full marks for the question
6. All the mathematical symbols and abbreviations have their usual meanings.

1. a) Describe the Manners and Place of Articulation in sound production.

b) Explain the source filter or source system model of speech production. 5+5

2. a) Why the child speech has high F0 and formant compare to an adult ?

b) Explain the different type of sound generation with respect to different position or variation of human vocal track. 4+6

3. a) What is a phoneme ? Explain in details, the vowels, semi-vowels, diphthongs and consonants.