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Total No. of Questions : 08]   [Total No. of Pages : 02

Paper ID [EC508]

(Please fill this Paper ID in OMR Sheet)

M.Tech.

DIGITAL SPEECH AND IMAGE PROCESSING (EC - 508)

Time : 03 Hours   Maximum Marks : 100

Instruction to Candidates:

1) Attempt any **Five** questions.

2) **All** questions carry equal marks.

Q1) (a) Explain the Applications of FIR filters in speech processing.

(b) Give the comparison of performance of IIR and FIR filters in speech and image processing.

Q2) (a) Explain the Acoustic theory of speech production in detail.

(b) What are the effects of losses in the vocal tract and effects of radiation at the lips?

Q3) (a) What are the various practical considerations for the design of digital filter banks for speech processing?

(b) Explain the working of isolated digit recognition system.

Q4) (a) What do you mean by pitch detection. Explain the pitch synchronous spectrum analysis.

(b) Give the detail of various methods of speech recognition.

Q5) (a) Show that the Fourier transform of an autocorrelation function $f(x)$ is equal to power spectral density.

(b) Prove that the magnitude of determinant of a unitary transform is unity. Also show that all the eigenvalues of a unitary matrix have unity magnitude.

Q6) (a) Show that Fourier transform of:
$$f_{even}(x) = \text{Re}\ \{F[f(x)]\}$$

(b) Show that the $N \times N$ cosine matrix C is orthogonal. Verify your proof for the case $N = 4$.

Q7) (a) Explain the generalize Weiner filter computational technique for image restoration.

(b) What do you mean by image segmentation? Give the detail of amplitude segmentation methods.

Q8) Write short notes on the following:

(a) Edge Enhancement.

(b) Thresholding.

(c) Predictive coding techniques.

(d) Slant transforms.