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M.Tech.

DIGITAL SPEECH AND IMAGE PROCESSING

SUBJECT CODE : EC - 508

Paper ID : [E0567]

[Note : Please fill subject code and paper ID on OMR]

Time : 03 Hours **Maximum Marks : 100**

Instruction to Candidates:

1) Attempt any **Five** questions.
2) **All** questions carry equal marks.

Q1) Determine the digital transfer functions obtained by transforming the following causal analog transfer functions using the impulse invariance method. Assume T = 0.3 sec.

(a) $H(s) = \dfrac{4(3s+7)}{(s+2)(s^2+4s+5)}$.

(b) $H(s) = \dfrac{8s^2+37s+56}{(s+4)(s^2+2s+10)}$.

Q2) The following causal IIR digital transfer functions were designed using the impulse invariance method with T = 0.2 sec. Determine their respective parent causal analog transfer functions.

(a) $G(z) = \dfrac{3z}{z-e^{-1.5}} + \dfrac{4z}{z-e^{-1.8}}$.

(b) $G(z) = \dfrac{ze^{-1.2}\sin(1.5)}{z^2 - 2ze^{-1.2}\cos(1.5) + e^{-2.4}}$.

Q3) Explain the frequency sampling method for the design of FIR filters.

Q4) Determine the Lattice coefficients corresponding to the FIR filter with system function

$$H(z)=A_3(z)=1+\frac{13}{24}z^{-1}+\frac{5}{8}z^{-2}+\frac{1}{3}z^{-3}.$$

Q5) Explain the model of Human speech production.

Q6) Explain, what do you mean by Backward Linear Prediction?

Q7) Explain how Wiener filtering is helpful in image processing?

Q8) Write short notes on the following:

(a) Karhunen-Loeve compression.

(b) Image enhancement.

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