List of possible questions (Incomplete)

- Define OTF & MTF
- Define pth-order Markov process
- Orthogonality and independence uncorrelated
- (Two random variables x & y)
- Define KLT
- Separable stationary covariance function
- SDF: Spectral density function
- $\mathcal{F} T \text{ of autocorrelation/covariance sequence}$
- $= ?$
- Define first-order entropy
- Define rate distortion function

Chapter 2
Define uniform sampling
  " nonuniform "
  " Nyquist theorem
  " Aliasing
  " ZOH, FOH & 2nd order hold
    (Explain graphically)
  " quantizer (uniform/nonuniform)
    (midtread/midrise)
  " zero memory quantizer
    what is a Lloyd–Max quantizer
    " piecewise uniform (constant)
    quantizer.

For uniform pdf, doubling the # of
output levels leads to how much increase
in PSNR (dB)? How is the bandwidth
affected?

Define comparator (also sketch)
(If this is a uniform or nonuniform quantizer)

Explain the significance
Input/output levels \( \left( \frac{f_k}{r_k} \right) \) are given for zero mean/unit variance random variable \( u \). What are the corresponding levels \( \tilde{f}_k/\tilde{r}_k \) for non-zero mean \( u \neq 0 \) and variance \( \sigma^2 \neq 1 \). How do you use the tables (Lloyd Max) for this case? (See Tables 4.1/4.2).

Define contrast quantization (sketch) what are the advantages?

Define pseudorandom noise quantization (sketch) what are the advantages?

Define Halftone image generation (sketch)

In minimizing MSE, in the regions of large PDF step size in - and vice versa. Justify
For a nonuniform symmetric pdf apply a uniform quantizer, step size = Δ, # of output levels = L. Assume L is fixed, i.e., constant. How does varying the step size Δ affect overload noise/quantization noise? What are overload and granular noises?
Consider uniform symmetric quantization (Uniform)

8 output levels are coded by FLC (Fixed length coding)

FLC or FWL (fixed word length). How many bits/level? What are the advantages?

VLC (Variable length coding): Define advantages and disadvantages?
Discrete convolution in 2-D.

For shift-invariant systems,

\[ y(m, n) = \sum_{m', n'} h(m-m', n-n') x(m', n') \]

Sketch this for \( m \neq 0, \ n \neq 0 \)

Write down the operations.

Closed book/closed notes

Answer should be clear (no vagueness)