

- N.B. : (1) Question no. 1 is compulsory.  
 (2) Attempt any four questions out of remaining.  
 (3) Assume suitable data if required.

1. Solve any four:-

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(a) Find output of DT system with impulse response  $h(n) = \{-1, 1\}$  for input  $x(n) = \{2, -1, 2\}$



(b) Find Z transform of  $x(n) = \left(\frac{1}{4}\right)^n u(n)$

(c) Low pass filter is a smoothing filter- Explain

(d) Compare between Lossy and lossless filters

(e) Check the following signal for causality, time variance, linearity and stability  
 $y(n) = nx^2(n)$

2. (a) Perform Histogram equalization for the following image and plot original and 10 equalized histogram

Gray level	0	1	2	3	4	5	6	7
No. of pixel	200	270	100	70	70	80	140	150

(b) Determine the system function and response of the system to unit step signal for 10 the system  $y(n) = \frac{1}{2}y(n-1) + 2x(n)$

3. (a) Explain image restoration and its applications. 10

(b) Explain basic principles of detecting following in the images (i) point (ii) Lines 10  
 (iii) Edges

4. (a) Perform linear convolution using circular convolution. 10  
 for  $x(n) = \{-2, 1\}$  and  $h(n) = \{2, 3, 4\}$

(b) Explain classification of DT-signals and systems. 10

5. (a) Find 8-point DIT - FFT of  $x(n) = \{1, 2, 3, 4, 1, 2, 3, 4\}$  10

(b) Explain image segmentation based on thresholding 10

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6. (a) Given:-

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$$f = \begin{bmatrix} 1 & 1 & 2 & 1 \\ 2 & 1 & 1 & 2 \\ 1 & 3 & 2 & 1 \\ 2 & 1 & 2 & 1 \end{bmatrix}$$

Find 2D Hadmard Transform

(b) Explain the role of data fidelity criteria in image compression. 10

7. Write notes on any four:- 20

(a) Homomorphic filters

(b) Image enhancement in spatial domain

(c) Wavelet transform

(d) Filters in frequency domain

(e) Discrete Cosine Transform