

Code No: **R1641042**

R16

Set No. 1

IV B.Tech I Semester Regular Examinations, October/November - 2019
DIGITAL IMAGE PROCESSING

(Common to Electronics & Communication Engineering and Electronics & Instrumentation Engineering and Electronics & Computer Engineering)

Time: 3 hours

Max. Marks: 70

Question paper consists of Part-A and Part-B

Answer ALL sub questions from Part-A

Answer any FOUR questions from Part-B

PART-A (14 Marks)

1. a) Define 4-neighbors and 8-neighbors of a pixel. [2]
- b) What is meant by image enhancement? Why it is needed? [3]
- c) Sketch the probability density functions of Gaussian noise and salt-and-pepper noise. [2]
- d) Draw the block diagram of general image compression system. [2]
- e) Define Erosion and Dilation. [3]
- f) Write the applications of RGB color model. [2]

PART-B (4x14 = 56 Marks)

2. a) What are the various arithmetic operations used in digital image processing? Explain. [7]
- b) Explain about Hadamard transform and determine the Hadamard matrix for order $N = 8$. [7]
3. a) Explain about contrast stretching and Bit-Plane slicing. [7]
- b) Explain about notch filtering and write the use of it in image processing. [7]
4. a) Discuss about image denosing using spatial mean filters. [7]
- b) Explain about image restoration using minimum mean square error filtering. [7]
5. a) With an example, explain the concept of Run Length coding. [7]
- b) Discuss about wavelet functions used in multi resolution analysis. [7]
6. a) Write the applications of segmentation and explain threshold based segmentation. [7]
- b) Explain about morphological opening operation with example. [7]
7. a) Explain the use of intensity to color transformation in image processing. [7]
- b) Discuss about histogram processing of color images. [7]

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Set No. 2

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IV B.Tech I Semester Regular Examinations, October/November - 2019
DIGITAL IMAGE PROCESSING

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Time: 3 hours

Max. Marks: 70

Question paper consists of Part-A and Part-B

Answer ALL sub questions from Part-A

Answer any FOUR questions from Part-B

PART-A (14 Marks)

1. a) List out the various applications of SVD in image processing. [3]
- b) What is the difference between histogram equalization and histogram specification? [2]
- c) State Fourier-slice theorem. [2]
- d) What is the need for image compression? [3]
- e) Define hit-or-miss transform. [2]
- f) What are the advantages of color image processing? [2]

PART-B (4x14 = 56 Marks)

2. a) Explain the various distance measures used in image processing. [7]
- b) Explain about KL transform and write its use in image processing. [7]
3. a) Discuss about Log transformation and Power Law transformation, and write their applications. [7]
- b) With the necessary equations, explain the concept of homomorphic filtering. [7]
4. a) Discuss about image restoration using order static filters. [7]
- b) What is an inverse filtering? Explain how it is useful for image restoration and write the disadvantages of it. [7]
5. a) Explain the concept of lossless predictive coding. [7]
- b) Draw the diagram of two dimensional, four band filter bank for subband image coding and explain it. [7]
6. a) Define image gradient and explain how it is useful for edge detection. [7]
- b) Explain about morphological closing operation. [7]
7. a) Explain about CMY and CMYK color models, and write their applications. [7]
- b) What is intensity slicing and color coding? Explain their use in image processing. [7]

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Time: 3 hours

Max. Marks: 70

Question paper consists of Part-A and Part-B

Answer ALL sub questions from Part-A

Answer any FOUR questions from Part-B

PART-A (14 Marks)

1. a) Define spatial resolution and intensity resolution. [2]
- b) What is meant by an intensity level slicing? [2]
- c) Write the differences between image restoration and image enhancement. [3]
- d) Write the advantage of block transform coding. [2]
- e) List out the various masks used for edge detection. [2]
- f) Define Hue, Saturation and chromaticity. [3]

PART-B (4x14 = 56 Marks)

2. a) List out the various components used in general purpose image processing system and explain it. [7]
- b) Define Haar Transform and derive the Haar Transformation matrix for order $N = 4$. [7]
3. a) With the necessary equations, explain the concept of histogram equalization. [7]
- b) Discuss about image smoothing in the frequency domain using Butterworth low pass filters. [7]
4. a) Explain about adaptive median filter and write the advantages of it. [7]
- b) What is Radon Transform? Explain how it is used to obtain the projections of object. [7]
5. a) Draw the block diagram of lossy predictive model and explain it. [7]
- b) Discuss about scaling functions used in multi resolution analysis. [7]
6. a) What is the need for edge linking and explain about edge linking using local processing. [7]
- b) Discuss about morphological hole filling. [7]
7. a) Discuss about converting colors from HSI to RGB. [7]
- b) Explain about color image segmentation in RGB space. [7]

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Set No. 4

IV B.Tech I Semester Regular Examinations, October/November - 2019
DIGITAL IMAGE PROCESSING

(Common to Electronics & Communication Engineering and Electronics & Instrumentation Engineering and Electronics & Computer Engineering)

Time: 3 hours

Max. Marks: 70

Question paper consists of Part-A and Part-B

Answer ALL sub questions from Part-A

Answer any FOUR questions from Part-B

PART-A (14 Marks)

1. a) Write the properties of Walsh transform. [2]
- b) Define histogram of an image and write its significance. [3]
- c) Write short notes on median filter. [2]
- d) Define wavelet transform. [2]
- e) Explain the role of noise in image thresholding. [3]
- f) What is the need for color model? [2]

PART-B (4x14 = 56 Marks)

2. a) Explain the applications of image processing in infrared band, microwave band and radio bands. [7]
- b) Prove the following properties of 2D-DFT:
(i) Translation and Rotation (ii) Periodicity [7]
3. a) Explain about Image sharpening using second order derivative operator. [7]
- b) Discuss about image smoothing in the frequency domain using ideal low pass filters. [7]
4. a) Explain the various methods to estimate the degradation function. [7]
- b) Discuss about reconstruction using parallel beam filtered backprojections. [7]
5. a) What are the different types of redundancies in an image? Explain. [7]
- b) Explain the concept image pyramid. [7]
6. a) Discuss about image segmentation using region growing. [7]
- b) Explain about morphological smoothing and morphological gradient. [7]
7. a) Discuss about converting colors from RGB to HSI. [7]
- b) Explain about color image smoothing with necessary equations. [7]

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R16

Set No. 1

IV B.Tech I Semester Regular/Supplementary Examinations, March - 2021
DIGITAL IMAGE PROCESSING

**(Common to Electronics & Communication Engineering and Electronics & Instrumentation
Engineering and Electronics & Computer Engineering)**

Time: 3 hours

Max. Marks: 70

Question paper consists of Part-A and Part-B

Answer ALL sub questions from Part-A

Answer any FOUR questions from Part-B

PART-A (14 Marks)

1. a) Explain the function of image sensor. [3]
b) What are the advantages of filtering in frequency domain? [3]
c) Write the difference between image restoration and image enhancement. [2]
d) Compare orthogonal and bi-orthogonal wavelets. [2]
e) Explain how a point can be detected in an image. [2]
f) What is the purpose of color model? Explain. [2]

PART-B (4x14 = 56 Marks)

2. a) What is the need of image transform? List out various transforms used in Image Processing. [7]
b) Derive the basis function of Walsh transform. [7]
3. a) State and prove conjugate symmetry and orthogonality property of 2D DFT. [7]
b) Explain about histogram specifications. [7]
4. a) Explain Spatial filtering in Image enhancement. [7]
b) Define and Explain the geometric mean filtering. Write the advantages and disadvantages. [7]
5. a) Draw and explain the general image compression system model. [9]
b) Write a short note on Wavelet Packets. [5]
6. a) How can you control Over segmentation problem? Explain it. [7]
b) Explain about morphological hit-or-miss transform. [7]
7. a) What is color image smoothing? Explain how smoothing will done by neighborhood averaging. [9]
b) Briefly discuss about Complements on the color circle. [5]

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Time: 3 hours

Max. Marks

2

Question paper consists of Part-A and Part-B

Answer ALL sub questions from Part-A

Answer any FOUR questions from Part-B

PART-A (14 Marks)

1. a) Write some applications of KL transform. [3]
- b) Differentiate between linear spatial filter and non-linear spatial filter. [3]
- c) How to estimate the degradation function by experimentation. [2]
- d) Write the difference between Fourier transform and wavelet transform. [2]
- e) Explain the effect of noise on edge detection. [2]
- f) What is Image segmentation based on color. [2]

PART-B (4x14 = 56 Marks)

2. a) Explain the following terms:
 (i) Adjacency (ii) Connectivity (iii) Regions (iv) Boundaries [7]
 b) Compute Haar Transform for following N Value. N=8. [7]
3. a) With an example, explain the concept of histogram equalization. [7]
 b) Explain Spatial filtering in Image enhancement. [7]
4. a) Explain the need for Image restoration. [7]
 b) Explain about periodic noise reduction using frequency domain filtering. [7]
5. a) Write short notes on Image Pyramids and Sub band coding. [7]
 b) What are the various Multi resolution analysis requirements? Explain. [7]
6. a) Explain the significance of thresholding in image segmentation. [7]
 b) Define the morphological operation and Explain the following:
 (i) Erosion (ii) Dilation [7]
7. a) Explain pseudo color image processing and pseudo color coding approaches. [8]
 b) Write significance of RGB color model and Explain about it. [6]

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Set No. 3

IV B.Tech I Semester Regular/Supplementary Examinations, March - 2021
DIGITAL IMAGE PROCESSING

**(Common to Electronics & Communication Engineering and Electronics & Instrumentation
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Time: 3 hours

Max. Marks: 70

Question paper consists of Part-A and Part-B

Answer ALL sub questions from Part-A

Answer any FOUR questions from Part-B

PART-A (14 Marks)

1. a) Define neighborhood of a pixel. [3]
- b) What is log transformation? How it is useful in image processing. [3]
- c) Write the drawback of inverse filtering. [2]
- d) What do you meant by wavelet packet? [2]
- e) What is meant by image segmentation? Write its use in image processing. [2]
- f) Write the purpose of color model. [2]

PART-B (4x14 = 56 Marks)

2. a) State 2D sampling theorem and explain about aliasing in images. [7]
- b) Explain about KL Transform with an example. [7]
3. a) Explain the use of first derivative for image enhancement by taking a 3×3 region of image using the magnitude of the gradient. [7]
- b) Define Histogram of Image. Explain the concept of Histogram Equalization technique for Image enhancement. [7]
4. a) Explain the concept of Inverse Filtering and also mention the limitations of it. [7]
- b) Explain the concept of minimum mean square error filtering. [7]
5. a) Describe arithmetic coding with an example for compression of image. [7]
- b) What is meant by block transform coding? Explain. [7]
6. a) Explain the basics of intensity thresholding in image segmentation. [7]
- b) Prove that Erosion and Dilation are dual to each other. [7]
7. a) Discuss the procedure for conversion from RGB color model to HSI color model. [7]
- b) Describe the histogram based processing in color images. [7]

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IV B.Tech I Semester Regular/Supplementary Examinations, March - 2021
DIGITAL IMAGE PROCESSING

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Time: 3 hours

Max. Marks: 70

Question paper consists of Part-A and Part-B

Answer ALL sub questions from Part-A

Answer any FOUR questions from Part-B

PART-A (14 Marks)

1. a) What is the need for image transform? Explain. [3]
- b) Write short notes on selective filtering. [3]
- c) Give the relation for degradation model for Continuous function. [2]
- d) What is the need for Compression? [2]
- e) Write short notes on morphological gradient. [2]
- f) Explain color complements. [2]

PART-B (4x14 = 56 Marks)

2. a) Explain the fundamental steps in digital image processing which can be applied to images. [7]
- b) Give any five properties of two dimensional DFT. [7]
3. a) Explain about image smoothing using Ideal low pass filter. [7]
- b) How Gray level transformation helps in contrast enhancement? Discuss. [7]
4. a) What is the purpose of image restoration? Explain the model of image degradation and restoration process using suitable block diagram. [7]
- b) With an example, explain the concept of image reconstruction from projections. [7]
5. a) Draw the block diagram of lossless predictive coding model and explain it. [7]
- b) Explain about wavelet transform in two dimensions. [7]
6. a) Explain about Boundary Extraction and Region Filling Algorithm. [7]
- b) Explain watershed transformation and discuss about its advantages and disadvantages. [7]
7. a) Explain about color segmentation process. [7]
- b) Discuss any two color models used in color image processing. [7]

IV B.Tech I Semester Supplementary Examinations, July/Aug - 2021**DIGITAL IMAGE PROCESSING**

**(Common to Electronics & Communication Engineering and Electronics & Instrumentation
Engineering and Electronics & Computer Engineering)**

Time: 3 hours**Max. Marks: 70***Question paper consists of Part-A and Part-B**Answer ALL sub questions from Part-A**Answer any FOUR questions from Part-B************PART-A (14 Marks)**

1. a) Explain the Adjacency between pixels. [3]
- b) What is selective filtering? [3]
- c) Write a short note on noise models. [2]
- d) Write note on Golomb coding. [2]
- e) What is the role of noise in image thresholding? [2]
- f) What is noise in color image? [2]

PART-B (4x14 = 56 Marks)

2. a) Explain briefly about sensor strips and sensor arrays in image acquisition. [7]
- b) Explain about Walsh transform, and find 1D Walsh basis function for fourth order system. [7]
3. a) Explain briefly about Histogram Equalization and Specification. [7]
- b) Explain the correspondence between filtering in the spatial and frequency domains. [7]
4. a) Discuss briefly about spatial filtering. [7]
- b) What is meant by minimum mean square error filter? Explain it. [7]
5. a) Explain the Huffman coding with example. [7]
- b) Write a brief note on wavelet transform in two dimensions. [7]
6. a) Explain briefly about line detection. [7]
- b) Discuss briefly about morphological smoothing and morphological gradient. [7]
7. a) Explain the color fundamentals of color image processing. [7]
- b) Explain the segmentation in RGB vector space. [7]

IV B.Tech I Semester Supplementary Examinations, February- 2020
DIGITAL IMAGE PROCESSING

**(Common to Electronics & Communication Engineering and Electronics & Instrumentation
Engineering and Electronics & Computer Engineering)**

Time: 3 hours

Max. Marks: 70

Question paper consists of Part-A and Part-B

Answer ALL sub questions from Part-A

Answer any FOUR questions from Part-B

PART-A(14 Marks)

1. a) Define picture element. [2]
- b) Differentiate spatial domain and frequency domain. [2]
- c) Write a short note on image degradation process. [3]
- d) Write about bit-plane coding. [3]
- e) What is hole filling? [2]
- f) What is color model? List them. [2]

PART-B(4x14 = 56 Marks)

2. a) Write and explain the fundamental steps in digital image processing. [7]
- b) What is Singular Value Decomposition (SVD) transform? Explain and write its properties and its applications. [7]
3. a) Explain the combining spatial enhancement methods. [7]
- b) Explain briefly about Butterworth High pass filters and Gaussian High pass filters. [7]
4. a) What are the three principles to estimate the degradation function? Explain them. [7]
- b) Explain Fourier-Slice theorem. [7]
5. a) Discuss briefly about Run-Length coding with example. [7]
- b) What is meant by Subband coding? Explain it. [7]
6. a) Write a note on Dilation and Duality. [7]
- b) Discuss about gradient operator and explain its significance in edge detection. [7]
7. a) What is HSI color model? Explain it. [7]
- b) Explain color image smoothing and color image sharpening. [7]

Code No: **RT41043**

R13

Set No. 1

IV B.Tech I Semester Supplementary Examinations, February - 2019
DIGITAL IMAGE PROCESSING
(Common to Electronics and Computer Engineering, Electronics and Communication
Engineering and Electronics and Instrumentation Engineering)

Time: 3 hours

Max. Marks: 70

Question paper consists of Part-A and Part-B

Answer ALL sub questions from Part-A

Answer any THREE questions from Part-B

PART-A (22 Marks)

1. a) Enlist the applications of KL transform. [4]
- b) Write short notes on log transformation. [3]
- c) Explain the estimation of degradation function by Experimentation. [4]
- d) Short note on noise in color images. [3]
- e) What do you meant by wavelet packet? [4]
- f) Specify some fundamental conditions of segmentation. [4]

PART-B (3x16 = 48 Marks)

2. a) Discuss the image acquisition using a single sensor, sensor strips and sensor arrays. [8]
b) What is Hadamard transform? Explain in detail and Write its properties. [8]
3. a) Discuss how the various filter masks are generated to sharpen images in spatial filters. [8]
b) Illustrate homomorphic filtering approach for image enhancement. [8]
4. a) With relevant mathematical expressions, explain how a Wiener filter achieves restoration of a given degraded image. [8]
b) Explain linear position invariant degradation employed for image restoration. [8]
5. a) Explain pseudo color image processing and pseudo color coding approaches. [8]
b) Describe the histogram based processing in color images. [8]
6. a) Discuss sub-band coding with neat sketch. [8]
b) Describe arithmetic coding with an example for compression of image. [8]
7. a) Discuss segmentation using morphological watersheds. [8]
b) Explain Hit-or-Mass transformation technique. [8]

Code No: **RT41043**

R13

Set No. 1

IV B.Tech I Semester Supplementary Examinations, February- 2020
DIGITAL IMAGE PROCESSING

(Common to Electronics and Computer Engineering, Electronics and Communication
Engineering and Electronics and Instrumentation Engineering)

Time: 3 hours

Max. Marks: 70

Question paper consists of Part-A and Part-B

Answer ALL sub questions from Part-A

Answer any THREE questions from Part-B

PART-A(22 Marks)

1. a) Explain image formation in the eye. [4]
- b) Explain frequency aliasing. [4]
- c) Write short note on Notch filters. [4]
- d) Define Brightness, Hue and saturation. [3]
- e) Write the difference between analysis bank and synthesis bank in Multi resolution analysis. [3]
- f) What is meant by border clearing? [4]

PART-B(3x16 = 48 Marks)

2. a) Explain linear versus non linear operations. [8]
- b) Describe the Haar transform in image processing with suitable expressions. [8]
3. a) Why histogram equalization is needed? Illustrate histogram equalization with an example. [8]
- b) Explain the basic concept of any two methods piecewise linear transformation function used in image enhancement. [8]
4. a) Discuss the minimum mean square error filtering which includes both the degradation function and statistical characteristics of noise into the restoration process. [8]
- b) With relevant probability density function, explain i) Rayleigh Noise ii) Erlang (Gamma) Noise iii) Uniform noise. [8]
5. a) Explain about pseudo color image processing. [8]
- b) Discuss about image segmentation based on color. [8]
6. a) Explain the need of Image Pyramid in multi resolution processing. [8]
- b) Discuss Huffman coding with example for image compression. [8]
7. a) Discuss point detection, line detection and edge detection with an example. [8]
- b) Explain Convex Hull with neat sketch. [8]



IV B.Tech I Semester Supplementary Examinations, February/March - 2018
DIGITAL IMAGE PROCESSING

**(Common to Electronics and Computer Engineering, Electronics and Communication
Engineering and Electronics and Instrumentation Engineering)**

Time: 3 hours

Max. Marks: 70

Question paper consists of Part-A and Part-B

Answer ALL sub questions from Part-A

Answer any THREE questions from Part-B

PART-A (22 Marks)

1. a) Define the following terms:
 (i) Image (ii) Resolution (iii) Pixel and (iv) Digital Image [4]
- b) Compare Image Enhancement and Image Restoration. [4]
- c) Give the relation for degradation model for Continuous function. [3]
- d) Differentiate Pseudo color image processing and full color image processing. [4]
- e) What is the need for Compression? [4]
- f) What are the applications of Image segmentation? [3]

PART-B (3x16 = 48 Marks)

2. a) Compute Haar Transform for following N Value. N=8. [8]
- b) Explain how Fourier transforms are useful in digital image processing and explain the properties of Fourier transform. [8]
3. a) Define Histogram of Image. Explain the concept of Histogram Equalization technique for Image enhancement. [8]
- b) Explain Spatial filtering in Image enhancement. [8]
4. a) Explain the need for Image restoration. [8]
- b) Explain the concept of Inverse Filtering and also mention the limitations of it. [8]
5. a) Explain about color segmentation process. [8]
- b) Discuss the procedure for conversion from RGB color model to HSI color model. [8]
6. a) Draw and explain the general image compression system model. [8]
- b) Write short notes on Image Pyramids and Sub band coding. [8]
7. a) Explain the significance of thresholding in image segmentation. [8]
- b) Write short notes on some basic morphology algorithms. [8]

IV B.Tech I Semester Supplementary Examinations, July/Aug - 2021
DIGITAL IMAGE PROCESSING

**(Common to Electronics and Computer Engineering, Electronics and Communication
Engineering and Electronics and Instrumentation Engineering)**

Time: 3 hours

Max. Marks: 70

Question paper consists of Part-A and Part-B

Answer ALL sub questions from Part-A

Answer any THREE questions from Part-B

PART-A (22 Marks)

1. a) Compare Gray Level Image and Binary Image. [4]
- b) What are the benefits of processing an image in the frequency domain? [3]
- c) Write the properties of Image degradation model. [3]
- d) Explain the characteristics of color Image. [4]
- e) Compare Lossy and Lossless Compression. [4]
- f) What is Image segmentation? Explain the techniques of detecting different gray level discontinues in digital image. [4]

PART-B (3x16 = 48 Marks)

2. a) Explain the role of Sampling and Quantization in Digital Image Processing. [8]
- b) Explain about the basic relationships and distance measures between Pixels in a digital image. [8]
3. a) Explain about the mechanics of filtering in spatial domain. Mention the points to be considered in implementing neighborhood operations for spatial filtering. [8]
- b) Write short notes on Image enhancement in Frequency domain. [8]
4. a) With the required diagram and derivation explain the implementation of Weiner filter. [8]
- b) Explain about Constrained least squares restoration process for Image Restoration. [8]
5. a) Explain about different color models used in color image processing. [8]
- b) Write short notes on noise in color images. [8]
6. a) With neat block diagram explain Transform coding system. [8]
- b) Briefly explain about Multi-resolution Processing. [8]
7. a) Explain about the process of image segmentation using region growing. [8]
- b) With neat sketches explain Dilation and Closing. [8]

IV B.Tech I Semester Supplementary Examinations, March - 2017
DIGITAL IMAGE PROCESSING

**(Common to Electronics & Communication Engineering, Electronics & Instrumentation
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Time: 3 hours

Max. Marks: 70

Question paper consists of Part-A and Part-B

Answer ALL sub questions from Part-A

Answer any THREE questions from Part-B

PART-A (22 Marks)

1. a) Describe Weber ratio. [4]
- b) Illustrate first and second derivatives of a 1-D digital function representing a section of horizontal intensity profile from an image. [4]
- c) Explain about Arithmetic mean filter. [4]
- d) Discuss about Tonal correction. [4]
- e) Write a short note on Compression Ratio. [4]
- f) What is global, Local and dynamic or adaptive threshold? [2]

PART-B (3x16 = 48 Marks)

2. a) Explain Fast Fourier Transform (FFT) in detail. [8]
- b) Describe image formation in the eye with brightness adaptation and discrimination. [8]
3. a) What effect would setting to zero the half of lower-order bit planes have on the histogram of an image in general. [8]
- b) Discuss the limiting effect of repeatedly applying a 3x3 low-pass spatial filter to a digital image. You may ignore border effects. Is this effect different from applying 5x5 filter? [8]
4. a) What are the two approaches for blind image restoration? Explain in detail. [8]
- b) Explain about interactive image restoration. [8]
5. a) Briefly discuss about Complements on the color circle. [8]
- b) What is color image smoothing? Explain how smoothing will done by neighborhood averaging. [8]
6. a) Explain about the Fast Wavelet Transform. [12]
- b) Write a short note on Wavelet Packets. [4]
7. a) How can you control Over segmentation problem? Explain it. [8]
- b) Write short notes on Haar Transforms. [8]

IV B.Tech I Semester Regular Examinations, November - 2016
DIGITAL IMAGE PROCESSING

**(Common to Electronics & Communication Engineering, Electronics & Instrumentation
Engineering and Electronics & Computer Engineering)**

Time: 3 hours

Max. Marks: 70

Question paper consists of Part-A and Part-B

Answer ALL sub questions from Part-A

Answer any THREE questions from Part-B

PART-A (22 Marks)

1. a) Define neighbors of a pixel. [3]
- b) Write short notes on selective filtering. [4]
- c) Write the difference between image restoration and image enhancement. [4]
- d) What is the advantage of color in image processing applications? [4]
- e) What is meant by digital image water marking? [3]
- f) What is meant by image segmentation? Write its use in image processing. [4]

PART-B (3x16 = 48 Marks)

2. a) Explain the following mathematical operations on digital images
 - i) Array versus Matrix operations
 - ii) Linear versus Nonlinear Operations
[8]
- b) Explain the following two properties of 2D-DFT:
 - i) Convolution
 - ii) Correlation
[8]
3. a) What is meant by histogram specification? Explain. [8]
- b) Explain image smoothing using ideal lowpass filters and Butterworth lowpass filters. [8]
4. a) What are the advantages of adaptive filters? Explain about adaptive median filter. [8]
- b) Explain about image restoration using inverse filtering. Write the draw backs of this method. [8]
5. a) What is Pseudocolor image processing? Explain. [8]
- b) Explain about color image smoothing. [8]
6. a) Explain two-band subband coding and decoding system. [8]
- b) With an example, explain about run-length coding. [8]
7. a) What is Hit-or-Miss transformation? Explain. [8]
- b) Explain about edge detection using gradient operator. [8]



IV B.Tech I Semester Regular Examinations, November - 2016
DIGITAL IMAGE PROCESSING
(Common to Electronics & Communication Engineering, Electronics & Instrumentation Engineering and Electronics & Computer Engineering)

2

Time: 3 hours

Max. Marks: 70

*Question paper consists of Part-A and Part-B**Answer ALL sub questions from Part-A**Answer any THREE questions from Part-B*

PART-A (22 Marks)

1. a) What is the need for image transform? Explain. [4]
- b) What is meant by moiré patterns? Explain. [4]
- c) Draw the model of Image degradation/Restoration process. [3]
- d) What is the significance of color model? [4]
- e) Define subband coding? [3]
- f) Explain how a point can be detected in an image? [4]

PART-B (3x16 = 48 Marks)

2. a) Explain the various basic relationships between pixels. [8]
- b) What is Haar Transform? Write the procedure to determine the Haar transformation matrix. [8]
3. a) Explain the following operations: [8]
 - i) Contrast stretching
 - ii) Bit-plane slicing
- b) What is notch filter? Explain its use in image processing. [8]
4. a) List out different noise probability density functions used in image processing applications. [8]
- b) With an example, explain how an image can be reconstructed from projections. [8]
5. a) Explain about RGB color model? [8]
- b) Explain about histogram processing of color images. [8]
6. a) What are the various requirements for multi-resolution analysis? Explain. [8]
- b) Draw the functional block diagram of image compression system and explain the purpose of each block. [8]
7. a) Explain the following morphological algorithms [8]
 - i) Boundary extraction
 - ii) Hole filling
- b) What is meant by edge linking? Explain edge linking using local processing. [8]

IV B.Tech I Semester Regular Examinations, November - 2016**DIGITAL IMAGE PROCESSING**

**(Common to Electronics & Communication Engineering, Electronics & Instrumentation
Engineering and Electronics & Computer Engineering)**

Time: 3 hours**Max. Marks: 70**

Question paper consists of Part-A and Part-B

Answer ALL sub questions from Part-A

Answer any THREE questions from Part-B

PART-A (22 Marks)

1. a) What is meant by isopreference curves? Explain. [4]
- b) What is log transformation? How it is useful in image processing? [3]
- c) Explain about alpha-trimmed mean filter? [4]
- d) What is meant by pixel depth? Explain. [3]
- e) What is image compression? Why it is needed? Explain. [4]
- f) Explain the effect of noise on edge detection. [4]

PART-B (3x16 = 48 Marks)

2. a) What are the various fundamental steps in digital image processing? Explain. [8]
- b) Find the Haar transformation matrix for $N = 8$. [8]
3. a) Explain image sharpening using laplacian operator. [8]
- b) With necessary equations, explain about Homomorphic filtering. [8]
4. a) Explain how periodic noise can be reduced using frequency domain filtering. [8]
- b) What are the different ways to estimate the degradation function? Explain. [8]
5. a) Explain the procedure of converting colors from RGB to HSI. [8]
- b) Explain about color image sharpening. [8]
6. a) Discuss about wavelet transform in two dimensions. [8]
- b) What is block transform coding? Explain. [8]
7. a) Explain the following morphological algorithms [8]
 i) Thinning ii) Thickening
- b) Explain edge linking using Hough transform. [8]

IV B.Tech I Semester Regular Examinations, November - 2016**DIGITAL IMAGE PROCESSING**

(Common to Electronics & Communication Engineering, Electronics & Instrumentation Engineering and Electronics & Computer Engineering)

Time: 3 hours**Max. Marks: 70**

Question paper consists of Part-A and Part-B

Answer ALL sub questions from Part-A

Answer any THREE questions from Part-B

PART-A (22 Marks)

1. a) Explain about image acquisition using a circular sensor strip. [4]
- b) What are the advantages and disadvantages of local histogram processing when compared to global histogram processing. [4]
- c) What is meant by image restoration? [3]
- d) What is the purpose of color model? Explain. [3]
- e) Write the difference between wavelet transform and Fourier transform. [4]
- f) Prove that Erosion and dilation are duals of each other. [4]

PART-B (3x16 = 48 Marks)

2. a) Explain about image sampling and Quantization. [8]
- b) Prove that both the 2-D continuous and discrete Fourier transforms are linear operations. [8]
3. a) Explain the concept of Unsharp masking and Highboost filtering. [8]
- b) Explain image sharpening using Butterworth highpass and Gaussian highpass filters. [8]
4. a) What are the different types of mean filters used for noise reduction? Explain. [8]
- b) Explain about image restoration using minimum mean square error filtering. [8]
5. a) Explain the procedure of converting colors from HSI to RGB. [8]
- b) Discuss about noise in color images. [8]
6. a) Compute the Haar transform of the 2 x 2 image [8]

$$F = \begin{bmatrix} 3 & -1 \\ 6 & 2 \end{bmatrix}$$
- b) With an example, explain Huffman coding. [8]
7. a) With necessary figures, explain the opening and closing operations. [8]
- b) Discuss about region based segmentation. [8]

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IV B.Tech I Semester Regular/Supplementary Examinations, October/November - 2017
DIGITAL IMAGE PROCESSING

**(Common to Electronics and Computer Engineering, Electronics and Communication
Engineering and Electronics and Instrumentation Engineering)**

Time: 3 hours**Max. Marks: 70**

Question paper consists of Part-A and Part-B

Answer ALL sub questions from Part-A

Answer any THREE questions from Part-B

PART-A (22 Marks)

1. a) Define D₄ and D₈ distances. [3]
- b) What are the advantages of filtering in frequency domain? [4]
- c) How to estimate the degradation function by experimentation? [4]
- d) Define brightness, hue and saturation. [3]
- e) Write short notes on spatial redundancy. [4]
- f) Write short notes on morphological gradient. [4]

PART-B (3x16 = 48 Marks)

2. a) What is meant by image interpolation? Discuss about various interpolation methods. [8]
- b) What is the need of image transform? List out various transform used in image processing. [8]
3. a) With an example, explain the concept of histogram equalization. [8]
- b) State 2D sampling theorem and explain about aliasing in images. [8]
4. a) Explain about noise reduction in an image using band reject and band pass filters. [8]
- b) Explain the concept of minimum mean square error filtering. [8]
5. a) Explain about RGB color model and write its applications. [8]
- b) Describe about histogram processing in color images. [8]
6. a) Draw the diagram of two band subband coding and decoding system, and explain it. [8]
- b) With an example, explain about arithmetic coding. [8]
7. a) Discuss about opening and closing for gray scale images. [8]
- b) Explain the detection of isolated points in an image. [8]

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IV B.Tech I Semester Regular/Supplementary Examinations, October/November -

DIGITAL IMAGE PROCESSING

(Common to Electronics and Computer Engineering, Electronics and Communication
Engineering and Electronics and Instrumentation Engineering)

Time: 3 hours

Max. Marks: 70

Question paper consists of Part-A and Part-B

Answer ALL sub questions from Part-A

Answer any THREE questions from Part-B

PART-A (22 Marks)

1. a) What is meant by spatial resolution and explain its significance. [4]
- b) Define Fourier spectrum and Phase angle of 2D-DFT. [3]
- c) Write short notes on Max and Min filters. [4]
- d) Write short notes on chromaticity and tristimulus values. [4]
- e) Explain about subjective fidelity criteria. [3]
- f) Explain the duality of erosion and dilation operations. [4]

PART-B (3x16 = 48 Marks)

2. a) Explain the following terms:
 (i) Adjacency (ii) Connectivity (iii) Regions (iv) Boundaries [8]
 b) Obtain the Haar transformation matrix for N = 8. [8]
3. a) Explain the use of histogram statistics for image enhancement. [8]
 b) Prove the validity of the discrete convolution theorem of two variables. [8]
4. a) What is an adaptive median filter? Explain its use for noise reduction in an image. [8]
 b) With an example, explain the concept of image reconstruction from back projections. [8]
5. a) Discuss about CMY and CMYK color models. [8]
 b) Discuss about noise in color images. [8]
6. a) Explain the concept of wavelet packets and write its advantages. [8]
 b) Draw the functional block diagram of general image compression system and explain it. [8]
7. a) Explain the following morphological algorithms:
 (i) Boundary extraction (ii) Hole filling [8]
 b) Define image gradient and explain its use in edge detection. [8]

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IV B.Tech I Semester Regular/Supplementary Examinations, October/November - 2017
DIGITAL IMAGE PROCESSING

**(Common to Electronics and Computer Engineering, Electronics and Communication
Engineering and Electronics and Instrumentation Engineering)**

Time: 3 hours**Max. Marks: 70***Question paper consists of Part-A and Part-B**Answer ALL sub questions from Part-A**Answer any THREE questions from Part-B*

PART-A (22 Marks)

1. a) Compute the Haar transform of the 2 X 2 image $F = \begin{bmatrix} 3 & -1 \\ 6 & 2 \end{bmatrix}$ [4]
- b) What is Log Transformation and write its use in image processing. [3]
- c) Write the expression for contraharmonic mean filter and explain its use in image restoration. [4]
- d) What is the purpose of color model and list out some color models. [4]
- e) What is image compression? Why it is needed? [4]
- f) List out different masks used to compute the gradient. [3]

PART-B (3x16 = 48 Marks)

2. a) Explain the basic concepts of sampling and quantization in the generation of digital image. [8]
- b) Discuss about KL Transform and write its applications in image processing. [8]
3. a) Determine the convolution and correlation between the following images:

$$f(x, y) = \begin{bmatrix} 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 1 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 \end{bmatrix}$$
 and $g(x, y) = \begin{bmatrix} 1 & 2 & 3 \\ 4 & 5 & 6 \\ 7 & 8 & 9 \end{bmatrix}$ [8]
- b) Explain the following filters:
(i) Band reject and Band pass filters (ii) Notch filters [8]
4. a) What are the different approaches to estimate the noise parameters in an image? Explain. [8]
- b) State and explain the Fourier-Slice Theorem. [8]
5. a) Discuss the concept of converting colors from RGB to HSI. [8]
- b) With necessary equations, explain about color edge detection. [8]
6. a) What are the various Multiresolution analysis requirements? Explain. [8]
- b) What is meant by block transform coding? Explain. [8]
7. a) Explain about morphological hit-or-miss transform. [8]
- b) Discuss about edge linking using local processing. [8]

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IV B.Tech I Semester Regular/Supplementary Examinations, October/November - 2017
DIGITAL IMAGE PROCESSING

**(Common to Electronics and Computer Engineering, Electronics and Communication
Engineering and Electronics and Instrumentation Engineering)**

Time: 3 hours

Max. Marks: 70

Question paper consists of Part-A and Part-B

Answer ALL sub questions from Part-A

Answer any THREE questions from Part-B

PART-A (22 Marks)

1. a) Define Walsh Transform and write its properties. [4]
- b) What is meant by gamma correction? Why it is needed? [3]
- c) Write the difference between image restoration and image enhancement. [4]
- d) Write short notes on RGB to CMY conversion. [4]
- e) Write the difference between Fourier transform and wavelet transform. [4]
- f) Explain the effect of noise in edge detection. [3]

PART-B (3x16 = 48 Marks)

2. a) Explain about linear and nonlinear operations used in image processing. [8]
- b) State and Prove the translation and rotation properties of 2D-DFT. [8]
3. a) Explain the concept of weighted average filter. [8]
- b) With necessary equations, explain the concept of homomorphic filtering. [8]
4. a) List out some important noise probability density functions used in image processing and sketch their plots. [8]
- b) Discuss about Radon Transform and write its applications. [8]
5. a) Explain about intensity slicing and write its applications. [8]
- b) Discuss about segmentation in RGB vector space. [8]
6. a) Explain about wavelet transform in two dimensions. [8]
- b) Draw the block diagram of lossless predictive coding model and explain it. [8]
7. a) Explain the following morphological operations:
 - (i) Erosion
 - (ii) Dilation
- b) Explain the basics of intensity thresholding in image segmentation. [8]

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Engineering and Electronics and Instrumentation Engineering)****Time: 3 hours****Max. Marks: 70***Question paper consists of Part-A and Part-B**Answer ALL sub questions from Part-A**Answer any THREE questions from Part-B************PART-A (22 Marks)**

1. a) Explain the function of image sensor. [3]
- b) Differentiate between image enhancement and image restoration. [4]
- c) Write the drawback of inverse filtering. [4]
- d) Write short note on CMYK color model. [4]
- e) Compare orthogonal and biorthogonal wavelets. [3]
- f) Define gradient of an image. [4]

PART-B (3x16 = 48 Marks)

2. a) Explain the theory of sampling of an image. [8]
- b) Explain about KL Transform. [8]
3. a) Define histogram equalization. Explain the procedure for histogram equalization. [8]
- b) Define DFT. State and prove the following properties:
 (i) Correlation (ii) Scaling (iii) Periodicity [8]
4. a) Define blur of an image. Explain the different types of blurs. [8]
- b) Prove that median filter is a nonlinear filter with an example. [8]
5. a) Explain about HSI color mode. [8]
- b) Explain about color image segmentation. [8]
6. a) Define compression and explain the general compression system model. [8]
- b) Explain watermarking in Frequency domain. List out various applications of watermarking. [8]
7. a) Explain about erosion operation. [8]
- b) Explain watershed transformation and discuss about its advantages and disadvantages. [8]

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Set No. 2

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DIGITAL IMAGE PROCESSING

**(Common to Electronics and Computer Engineering, Electronics and Communication
Engineering and Electronics and Instrumentation Engineering)**

Time: 3 hours

Max. Marks: 70

Question paper consists of Part-A and Part-B

Answer ALL sub questions from Part-A

Answer any THREE questions from Part-B

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PART-A (22 Marks)

1. a) Write the properties of DST. [3]
- b) Define convolution and explain its use in image processing. [4]
- c) List out different noises in images. [4]
- d) Write the purpose of color model. [4]
- e) Explain the advantage of DWT over DCT. [3]
- f) Define laplacian of Gaussian. [4]

PART-B (3x16 = 48 Marks)

2. a) Explain the elements of an image processing system. [8]
- b) Explain about the discrete cosine transform and write its applications. [8]
3. a) Explain about image smoothing using Ideal low pass filter. [8]
- b) Explain about local histogram processing. [8]
4. a) Explain the image restoration with wiener filtering. [8]
- b) Explain parallel projection and fan beam projection based methods for image restoration. [8]
5. a) Explain the operation of color image smoothing and sharpening. [8]
- b) Explain about RGB color model. [8]
6. a) Explain about Huffman coding by taking an example. [8]
- b) What is an Image pyramid? Explain Gaussian and Laplace pyramids. [8]
7. a) Prove that erosion and dilation are dual to each other. [8]
- b) Define image segmentation. Give classification. Explain region based segmentation. [8]

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Set No. 3

IV B.Tech I Semester Regular/Supplementary Examinations, Oct/Nov - 2018

DIGITAL IMAGE PROCESSING

**(Common to Electronics and Computer Engineering, Electronics and Communication
Engineering and Electronics and Instrumentation Engineering)**

Time: 3 hours

Max. Marks: 70

Question paper consists of Part-A and Part-B

Answer ALL sub questions from Part-A

Answer any THREE questions from Part-B

PART-A (22 Marks)

1. a) Write the applications of KL Transform. [3]
- b) Write the properties of DCT. [4]
- c) Write the drawbacks of wiener filtering. [3]
- d) Write short notes on color slicing. [4]
- e) Derive haar basis for N=4. [4]
- f) Compare canny and laplacian of Gaussian edge operator. [4]

PART-B (3x16 = 48 Marks)

2. a) Define an image. List out and explain the various areas of applications of image processing. [8]
- b) Explain the slant transform. Derive the slant transform for N=8. [8]
3. a) Define 2D DFT. Prove the convolution property of 2D DFT. [8]
- b) Explain about intensity transformation functions. [8]
4. a) Explain the process of inverse filtering. [8]
- b) Explain about periodic noise reduction using frequency domain filtering. [8]
5. a) What is a chromacity diagram? Explain CIE chromacity diagram. [8]
- b) Explain about CMY color model. [8]
6. a) What is the need of compression? Explain about vector quantization method. [8]
- b) Explain about directional filter bank. [8]
7. a) What is Hit-or-Miss transformation? Explain. [8]
- b) Discuss about Roberts, Prewitt and Sobel edge detectors. [8]

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[8]

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Set No. 4

IV B.Tech I Semester Regular/Supplementary Examinations, Oct/Nov - 2018
DIGITAL IMAGE PROCESSING

**(Common to Electronics and Computer Engineering, Electronics and Communication
Engineering and Electronics and Instrumentation Engineering)**

Time: 3 hours

Max. Marks: 70

Question paper consists of Part-A and Part-B

Answer ALL sub questions from Part-A

Answer any THREE questions from Part-B

PART-A (22 Marks)

1. a) Write the applications of SVD. [3]
- b) Define log transformation and write its application. [4]
- c) Explain the advantage of wiener filter over inverse filter. [4]
- d) Write the advantages of color image processing. [4]
- e) Compare different image formats with reference to number of bits and compression. [3]
- f) Explain about point detection in image. [4]

PART-B (3x16 = 48 Marks)

2. a) Explain about image acquisition. [8]
- b) Construct Walsh basis for N=4. [8]
3. a) State and prove conjugate symmetry and orthogonality property of 2D DFT. [8]
- b) Explain about histogram specification. [8]
4. a) Define an image restoration. Explain the image restoration model. [8]
- b) Explain the geometric mean filtering. Write the advantages and disadvantages. [8]
5. a) Explain about histogram processing in color images. [8]
- b) Explain about Pseudo color image processing. [8]
6. a) Explain about Run Length coding with an example. [8]
- b) Discuss about sub band coding of 2D signal [8]
7. a) Explain opening and closing operations. [8]
- b) Explain about Hough transform. [8]

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DIGITAL IMAGE PROCESSING

**(Common to Electronics and Computer Engineering, Electronics and Communication
Engineering and Electronics and Instrumentation Engineering)**

Time: 3 hours

Max. Marks: 70

Question paper consists of Part-A and Part-B

Answer ALL sub questions from Part-A

Answer any THREE questions from Part-B

PART-A (22 Marks)

1. a) Explain three different level processes in image processing. [4]
- b) Explain image negative transformation. [4]
- c) Define Gaussian noise and its probability density function. [4]
- d) Explain color complements. [3]
- e) Define spatial and temporal redundancy. [4]
- f) What is Granulometry? [3]

PART-B (3x16 = 48 Marks)

2. a) Explain the fundamental steps in digital image processing which can be applied to images. [8]
- b) Derive the basis function of Walsh transform. [8]
3. a) Give any five properties of two dimensional DFT. [8]
- b) Explain the use of first derivative for image enhancement by taking a 3×3 region of image using the magnitude of the gradient. [8]
4. a) Explain the periodic noise reduction by frequency domain filtering with respect to notch filter. [8]
- b) What is the purpose of image restoration? Explain the model of image degradation and restoration process using suitable block diagram. [8]
5. a) Explain the procedure for converting colors from RGB to HIS and vice versa. [8]
- b) Discuss any two color model used in color image processing. [8]
6. a) What are the different image compression standards? Explain. [8]
- b) Describe MRA, scaling function and discuss clearly the concept of basis for wavelet subspace using Haar wavelet. [8]
7. a) Explain about Boundary Extraction and Region Filling Algorithm. [8]
- b) Explain Region Splitting and merging. [8]

