

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*

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**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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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*

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**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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**Set No. 3**

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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*

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**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**

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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*

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**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: [7]  
(i) Translation and Rotation (ii) Periodicity
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]

