

**R18**

**Code No: 157BF**

**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD**

**B. Tech IV Year I Semester Examinations, December-2023/January-2024**

**DIGITAL IMAGE PROCESSING**  
**(Electronics and Communication Engineering)**

**Time: 3 Hours**

**Max. Marks: 75**

**Note:** i) Question paper consists of Part A, Part B.

ii) Part A is compulsory, which carries 25 marks. In Part A, Answer all questions.

iii) In Part B, Answer any one question from each unit. Each question carries 10 marks and may have a, b as sub questions.

**PART – A**

**(25 Marks)**

- 1.a) What do you mean by image transformation? [2]
- b) Give Euclidean distance between two pixels. [3]
- c) What is a linear transformation? [2]
- d) What does alpha-blending do? [3]
- e) What do you mean by image denoising? [2]
- f) What is a median filter? What are the properties of a median filter? [3]
- g) What is an edge in an image? [2]
- h) What are the major effects in the erosion process? [3]
- i) How do you compute entropy in Huffman coding? [2]
- j) What is the principle behind predictive coding? [3]

**PART – B**

**(50 Marks)**

- 2.a) What kind of relationships exist between pixels? Explain. [5+5]
  - b) Give an overview of methods for image sampling. [5+5]
- OR**
- 3.a) What do you mean by wavelet transform? Explain Haar transform. [5+5]
  - b) What is Discrete Cosine Transform? What is Discrete Cosine Transform used for? [5+5]
4. Give an overview of neighborhood operations in image enhancement. [10]
- OR**
- 5.a) Explain with an example gray level slicing. [5+5]
  - b) Explain homomorphic filtering for image enhancement. [5+5]

- 6.a) Give an overview of stochastic image restoration techniques. [5+5]
- b) Give the frequency domain representation of Wiener filter. When a Wiener filter reduces to an inverse filter? [5+5]

**OR**

- 7.a) The blur filter  $h(m,n)$  is given below:

$$h(m,n) = \begin{bmatrix} 0.0187 & 0.0563 & 0.0563 & 0.0187 \\ 0.0562 & 0.1187 & 0.1187 & 0.0562 \\ 0.0562 & 0.1187 & 0.1187 & 0.0562 \\ 0.0187 & 0.0563 & 0.0563 & 0.0187 \end{bmatrix}$$

- b) Design the deblur filter using inverse filtering approach. [5+5]
- Explain simulated annealing method of image deconvolution. [5+5]

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8.a) Explain Canny edge-detection method.

b) Explain Prewitt, Sobel and Laplacian operators for image segmentation.

[5+5]

QA QA QA QA OR QA QA QA G

9.a) Explain thickening operation.

b) What do you mean by skeletonization? How do you obtain a skeleton?

[5+5]

10.a) Explain DPCM a lossy predictive coding.

b) Explain any one error-free compression technique.

[5+5]

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11. Explain in detail the steps in the process of JPEG image compression.

[10]

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