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APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

Sixth Semester B.Tech Degree Supplementary Examination May 2023 (2019 Scheme)



Course Code: ECT352

Course Name: DIGITAL IMAGE PROCESSING

Max. Marks: 100

Duration: 3 Hours

PART A

Answer all questions, each carries 3 marks.

Marks

- | | | |
|----|--|-----|
| 1 | What is Mach band effect? | (3) |
| 2 | Explain the terms (i) false contouring and (ii) m-adjacency. | (3) |
| 3 | What is the role of quantisation matrix in JPEG compression? | (3) |
| 4 | List the advantages of Walsh transform over Fourier Transform. | (3) |
| 5 | What is the difference between high pass filter and a high – frequency emphasis filter? How does the difference affect the resultant image? | (3) |
| 6 | What does the standard deviation of a histogram tell about the image? | (3) |
| 7 | A photograph is taken out of a side window of a car moving at a constant velocity of 80 km/hour. Why is it not possible to use an inverse or Wiener filter in general to restore the blurring in this image? | (3) |
| 8 | What are the advantages of Wiener filter over an inverse filter? | (3) |
| 9 | Compare the Canny edge detector with the Laplacian of Gaussian edge detector. | (3) |
| 10 | Distinguish between local and global thresholding techniques for image segmentation. | (3) |

PART B

Answer one full question from each module, each carries 14 marks.

Module I

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|----|--|------|
| 11 | a) Define the terms brightness, contrast and hue with respect to digital images. | (4) |
| | b) State and prove 2-D sampling theorem. | (10) |

OR

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|----|--|------|
| 12 | a) Discuss the conceptual relationship between the RGB and HIS colour models with neat sketches. | (10) |
| | b) Differentiate between spatial resolution and intensity resolution | (4) |

Module II

- 13 a) Explain JPEG Image compression standard. (7)
 b) Find the 1D Walsh basis for the fourth – order system (N=4). (7)

OR

- 14 a) Compute the 2D DFT of the matrix $x = \begin{bmatrix} 4 & 6 \\ 3 & 4 \end{bmatrix}$ (7)
 b) What is Block Toeplitz matrix? Give an example. (7)

Module III

- 15 a) Why does histogram equalization (discrete histogram equalization) not produce a perfectly flat histogram? (5)
 b) Explain the steps involved in homomorphic filtering (9)

OR

- 16 a) What is meant is histogram equalization? Explain how histogram equalization can be performed on a given gray scale image, with necessary mathematical details. (8)
 b) Explain the point operations used in image enhancement. (6)

Module IV

- 17 a) What is the difference between image restoration and image enhancement? (6)
 b) Explain linear image restoration using inverse filtering (8)

OR

- 18 a) Explain any two geometric transformations on an image (6)
 b) Explain the image restoration mechanism using Wiener filter. (8)

Module V

- 19 a) Explain the method of global thresholding for image segmentation. (8)
 b) Give three applications of image segmentation techniques. (6)

OR

- 20 a) Explain region splitting and merging in image segmentation with neat schematics (8)
 b) Explain the clustering technique used in image segmentation. (6)
