Reg No.:_____ Name:_____

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

Sixth Semester B.Tech Degree Regular and Supplementary Examination June 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 Define brightness, contrast, hue and saturation of an image. (3)

2 Explain Mach band effect. (3)

3 List any 2 properties of 2D DFT. (3)

4 Differentiate between Circulant and Toeplitz matrices with an example. (3)

5 Apply a 3 x 3 low pass filter mask on the input image $\begin{bmatrix} 2 & 4 & 6 \\ 3 & 5 & 2 \\ 4 & 5 & 8 \end{bmatrix}$ and obtain the output image. Assume zero padding. (3)

6 Discuss any two point processing technique in image enhancement. (3)

7 List the advantages of Weiner filtering over inverse filtering. (3)

8 List any three causes that can result in image degradation. (3)

9 Explain image segmentation using global thresholding. (3)

10 How are edges classified in an image? (3)

PART B

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

Module I

11 a) Explain various colour models in digital imaging. (6)

b) State and prove 2D sampling theorem for images. (8)

OR

12 a) Discuss the digital image formation and representation model. (8)

b) With suitable example, explain different types of (i) neighbourhood of a pixel (ii) adjacency of a pixel (6)

Module II

13 a) Compute 2D DFT of $\begin{bmatrix} 2 & 3 \\ 1 & 4 \end{bmatrix}$ (8)

b) Explain i) Run length coding ii) Bit plane coding (6)

OR

14 a) Explain the need for image compression. With the help of a block diagram explain image compression model. (7)

b) Compute DCT of the sequence {2, 1, 4, 3}. (7)

Module III

15 a) A digital image is represented as $\begin{bmatrix} 12 & 8 & 9 & 10 \\ 12 & 8 & 8 & 9 \\ 8 & 14 & 12 & 10 \\ 14 & 8 & 12 & 8 \end{bmatrix}$. Obtain the histogram equalized image. (8)

b) Show that illumination and reflectance components are separated in homomorphic filtering of images. (6)

OR

16 a) Discuss the use of different types of spatial mask in image enhancement and its effect. (8)

b) Explain low pass filtering and high pass filtering in frequency domain. (6)

Module IV

17 a) With necessary equations describe the method of image restoration using inverse filtering. (8)

b) With the help of a block diagram, explain image degradation and restoration model. (6)

OR

18 a) Explain image restoration using Weiner filtering with necessary equations. Specify the condition in which a Weiner filter reduces to an inverse filter. (8)

b) Explain the geometric transformations for image restoration. (6)

Module V

19 a) Explain the procedure of edge linking using Hough transform in detail. (7)

b) Discuss edge detection using 1st order and 2nd order derivatives. (7)

OR

20 a) Discuss the region-based approach for image segmentation. (7)

b) Discuss in detail any 2 clustering technique for image segmentation. (7)

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