

Reg No.: _____

Name: _____

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY
B.Tech Degree S6 (S, FE) Examination December 2024 (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

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|----|---|-----|
| 1 | Define hue and saturation concerning a digital image. | (3) |
| 2 | Draw a neat diagram of a pixel's eight neighbors in a digital image. | (3) |
| 3 | Define a block matrix with a suitable example. | (3) |
| 4 | Define the term Compression Ratio in digital image compression. | (3) |
| 5 | Write the equation of an ideal high-pass filter. Also, draw its frequency response. | (3) |
| 6 | Discuss the Negative Transformation processing in a digital image. | (3) |
| 7 | List any three factors affecting image degradation. | (3) |
| 8 | Explain any type of geometric transformation that can be applied to an image. | (3) |
| 9 | Explain how adaptive thresholding is performed in image segmentation. | (3) |
| 10 | Explain any three drawbacks of region growing in image segmentation. | (3) |

PART B*Answer one full question from each module, each carries 14 marks.***Module I**

- 11 a) "Perceived brightness is not a simple function of the intensity of the region" (8)
 Justify with a suitable example.

- b) Derive the expression for 2D sampling in Digital Image Processing. (6)

OR

- 12 a) Compare RGB and HSI colour models. Include necessary figures. (8)
b) Explain the working of a vidicon camera with the help of a neat diagram. (6)

Module II

- 13 a) State and prove any three properties of 2 D Fourier Transform. (9)
b) Determine if the following matrix is unitary or not $A = \frac{1}{\sqrt{2}} \begin{bmatrix} 1 & 1 \\ i & -i \end{bmatrix}$. (5)

OR

- 14 a) Explain the process of JPEG compression in an image with help of a neat block diagram. (9)
b) Perform 2D DCT on $f(m,n) = \begin{bmatrix} 1 & 2 & 3 & 4 \\ 1 & 2 & 3 & 4 \\ 1 & 2 & 3 & 4 \\ 1 & 2 & 3 & 4 \end{bmatrix}$ (5)

Module III

- 15 a) Perform histogram equalization of the image $I = \begin{bmatrix} 6 & 5 & 4 & 2 \\ 2 & 2 & 1 & 0 \\ 1 & 0 & 0 & 1 \\ 3 & 3 & 1 & 2 \end{bmatrix}$ (7)
b) Explain how unsharp masking is done on an image. (3)
c) Explain how high boost filtering is done on an image. Use necessary equations. (4)

OR

- 16 a) Derive the expression for a Laplacian filter mask. Also draw the different types of Laplacian masks which can be used for image sharpening. (7)
b) Explain contrast stretching with the help of graph. (7)

Module IV

- 17 a) Explain the three ways to estimate the degradation function in detail. (7)
- b) Explain image restoration using inverse filtering. (7)

OR

- 18 a) Explain image degradation model with neat diagram. (7)
- b) Explain how Weiner filter helps to restore degraded images with suitable equations. (7)

Module V

- 19 a) Compare global and local thresholding techniques in detail. (7)
- b) Explain an image analysis tool for refinement of an object boundary. (7)

OR

- 20 a) Explain the region growing method in image segmentation. (7)
- b) List out the steps to perform K-mean clustering in image segmentation. (7)
