



Reg No.: \_\_\_\_\_

Name: \_\_\_\_\_

**APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY**  
 Seventh Semester B.Tech Degree Supplementary Examination August 2021

**Course Code: CS463****Course Name: DIGITAL IMAGE PROCESSING**

Max. Marks: 100

Duration: 3 Hours

**PART A***Answer all questions, each carries 4 marks.*

Marks

- |    |  |     |
|----|--|-----|
| 1  | Differentiate image enhancement and restoration.                     | (4) |
| 2  | Define digital image. How to represent a digital image?              | (4) |
| 3  | Define unitary transform. Write the properties of unitary transform. | (4) |
| 4  | What is gamma correction?  | (4) |
| 5  | Differentiate smoothing and sharpening spatial filters.              | (4) |
| 6  | Differentiate Ideal high pass filter and Gaussian high pass filter.  | (4) |
| 7  | Differentiate global thresholding and local thresholding.            | (4) |
| 8  | How to detect isolated points in an image?                           | (4) |
| 9  | What is hit or miss transformation?                                  | (4) |
| 10 | Define signature.  | (4) |

**PART B***Answer any two full questions, each carries 9 marks.*

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|----|---|-----|
| 11 | a) Illustrate how the image is digitized by sampling and quantization   | (6) |
|    | b) Differentiate spatial domain and frequency domain.   | (3) |
| 12 | a) Define DFT. Write the properties of DFT. Prove that 4 x 4 DFT matrix is unitary.   | (6) |
|    | b) Determine whether the given matrix is unitary or not: $A = \frac{1}{\sqrt{2}} \begin{bmatrix} 1 & 1 \\ -1 & 1 \end{bmatrix}$ . | (3) |
| 13 | a) Compute the 2D DFT of the 4 X 4 grayscale image given below.   | (5) |

$$f[m, n] = \begin{bmatrix} 1 & 1 & 1 & 1 \\ 1 & 1 & 1 & 1 \\ 1 & 1 & 1 & 1 \\ 1 & 1 & 1 & 1 \end{bmatrix}$$

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|----|--|-----|
| b) | What is the function of an image sensor? | (2) |
| c) | Define neighbors of a pixel.             | (2) |

**PART C**

*Answer any two full questions, each carries 9 marks.*

- 14 a) Write short note on order-statistic filters. (4)
- b) What are the steps to be followed for filtering in the frequency domain? (5)
- 15 a) What is histogram equalisation? Explain the procedure for histogram equalisation. (6)
- b) Write notes on contrast stretching. (3)
- 16 a) Explain about smoothing and sharpening frequency domain filters. (9)

**PART D**

*Answer any two full questions, each carries 12 marks.*

- 17 a) Elucidate the use of chain codes to represent boundary in an image. (6)
- b) Define edge detectors. (2)
- c) Write notes on line detection masks. (4)
- 18 a) Explain the following (6)
  - i) region growing
  - ii) region splitting and merging
- b) What is image segmentation? Explain the various methods for thresholding based image segmentation. (6)
- 19 a) Explain about boundary segments. (6)
- b) Explain about the following morphological operations: (6)
  - a) Erosion
  - b) Dilation

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