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6E7101

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B.Tech. VI-Sem. (Main/Back) Examination, April/May - 2026
Artificial Intelligence and Data Science
6AID3-01 Digital Image Processing
CS, IT, AID, CAI, CDS, CCS, CIT, CSD, CSR

Time : 3 Hours

Maximum Marks : 70

Instructions to Candidates:

Attempt all Ten questions from Part A, Five questions out of seven questions from Part B and Three questions out of five questions from Part C.

Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly. Units of quantities used/calculated must be stated clearly.

Use of following supporting material is permitted during examination. (Mentioned in form No. 205).

PART - A

(Answer should be given up to 25 words only)

All questions are compulsory.

(10×2=20)

1. Explain image formation in the eye.
2. Explain about image acquisition using a circular sensor strip.
3. What are the advantages of filtering in frequency domain?
4. What is Pseudo-colouring?
5. What is meant by image restoration?
6. How to estimate the degradation function by experimentation?
7. Define redundancy. Write the various types of redundancy techniques.
8. What is image compression? Why it is needed?
9. What is meant by image segmentation?
10. Explain how a point can be detected in an image?

PART - B
(Analytical/Problem solving questions)

(5×4=20)

Attempt any Five questions.

1. Explain the basic concepts of sampling and quantization in the generation of digital image.
2. Write the difference between wavelet transform and Fourier transform.
3. Determine the convolution and correlation between the following images:

$$f(x, y) = \begin{bmatrix} 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 1 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 \end{bmatrix} \text{ and } g(x, y) = \begin{bmatrix} 1 & 2 & 3 \\ 4 & 5 & 6 \\ 7 & 8 & 9 \end{bmatrix}$$

4. Explain in detail about the HSI and CMYK color spaces.
5. What are the different types of mean filters used for noise reduction? Explain.
6. With an example, explain about Huffman coding.
7. Explain the basics of intensity thresholding in image segmentation.

PART - C

(Descriptive/Analytical/Problem Solving/Design questions)

Attempt any Three questions.

(3×10=30)

1. Enlist various fundamental steps in Digital Image Processing with neat block diagram and explain them in detail.
2. Discuss how the various filter masks are generated to sharpen images in spatial filters.
3. Discuss the minimum mean square error filtering which includes both the degradation function and statistical characteristics of noise into the restoration process.
4. What are the different types of image compression? Discuss the different image compression standards?
5. What is meant by edge linking? Why Edge Linking is Necessary? Explain edge linking using local and global processing.