BRAINWARE UNIVERSITY

Term End Examination 2024-2025
Programme – B.Tech.(CSE)-AIML-2021/B.Tech.(CSE)-AIML-2022
Course Name – Image Processing
Course Code - PEC-CSM501A
(Semester V)

Full Marks : 60   **Time : 2:30 Hours**
[The figure in the margin indicates full marks. Candidates are required to give their answers in their own words as far as practicable.]

Group-A
(Multiple Choice Type Question)   1 x 15=15
1.   *Choose the correct alternative from the following :*

(i)   Select an example of a histogram-based image enhancement

    a) Histogram equalization   b) Gaussian blurring
    c) Median filtering   d) Laplace Transform

(ii) Choose a method for enhancing image details in the spatial domain

    a) Unsharp masking   b) Histogram equalization
    c) Gradient-based filtering   d) Median filtering

(iii) Choose a technique primarily used for color enhancement

    a) Color balancing   b) Histogram equalization
    c) Gradient-based filtering   d) Median filtering

(iv) Choose the spatial domain filter commonly used for edge detection:

    a) Sobel filter   b) Fourier transform
    c) Median filter   d) Gaussian noise

(v)   Predict the impact of increasing the kernel size in a Gaussian blur filter:

    a) More blurring   b) More noise
    c) Increased contrast   d) Sharper edges

(vi) Predict the result of applying a sharpening filter to an image:

    a) Enhanced edges   b) Blurred edges
    c) Reduced contrast   d) Noise reduction

(vii) Predict the outcome of applying a bilateral filter to an image with sharp edges:

    a) Noise reduction   b) Edge preservation
    c) Image blurring   d) Color inversion

(viii) Predict the effect of applying a high-pass filter to an image with low-frequency content:

a) Edge enhancement
c) Image blurring
b) Noise reduction
d) Color inversion

(ix) Predict the technique used for spatial domain image compression.

a) Discrete Cosine Transform (DCT)
c) Vector Quantization (VQ)
b) Run-Length Encoding (RLE)
d) Haar Wavelet Transform

(x) Select the image compression technique that can have a variable level of compression.

a) JPEG
c) PNG
b) GIF
d) RLE

(xi) Choose the segmentation method that considers pixel connectivity.

a) K-Means
c) Watershed
b) Mean-Shift
d) DBSCAN

(xii) Choose the image compression method with high-quality support for transparency.

a) JPEG
c) PNG
b) GIF
d) BMP

(xiii) Select the image compression method known for its wide compatibility.

a) JPEG
c) PNG
b) GIF
d) BMP

(xiv) Choose the technique that attenuates a specific range of frequencies in an image.

a) Bandstop Filtering
c) Highpass Filtering
b) Bandpass Filtering
d) Lowpass Filtering

(xv) Predict the technique that helps in converting a grayscale image into a binary image.

a) Thresholding
c) Smoothing
b) Segmentation
d) Enhancing

Group-B
(Short Answer Type Questions)
3 x 5=15

2. Define the quantization in digital image processing. (3)
3. Develop a process to restore an image using the arithmetic mean filter. (3)
4. Explain the mechanism of edge-based segmentation process. (3)
5. Write the process to enhance image contrast using histogram equalization in the spatial domain. (3)
6. Estimate the process of thresholding in image processing. (3)

OR

Summarize the advantages and disadvantages of thresholding in image processing. (3)

Group-C
(Long Answer Type Questions)
5 x 6=30

7. Enumerate the application of image processing in X-ray imaging (5)
8. Discuss histogram processing in image processing (5)
9. Explain the use of the Laplacian operator for detecting discontinuities. (5)
10. Analyze gray level transformation in Image processing (5)
11. Explain the challenges and methods to handle noise in edge detection. (5)
12. Evaluate the principles and significance of Minimum Mean Square Error (Wiener) Filtering in image processing, elucidating its advantages, limitations, and real-world applications. (5)

OR

Compare filters in image restoration (5)