

GUJARAT TECHNOLOGICAL UNIVERSITY**BE- SEMESTER-VI (NEW) EXAMINATION – WINTER 2024****Subject Code:3162009****Date:05-12-2024****Subject Name: Machine Vision****Time:02:30 PM TO 05:00 PM****Total Marks:70****Instructions:**

1. Attempt all questions.
2. Make suitable assumptions wherever necessary.
3. Figures to the right indicate full marks.
4. Simple and non-programmable scientific calculators are allowed.

- Q.1**
- (a) Differentiate briefly between spatial and frequency domain work of image enhancement. **03**
 - (b) Explain sampling and quantization of digital image. **04**
 - (c) Explain various filters, which are used for removal of salt and pepper noise from the image. **07**
- Q.2**
- (a) Justify the statement : Both the size and coefficients of smoothing filter are significant for blurring the digital image. **03**
 - (b) With the help of graphical representation describe gray level slicing of digital image. **04**
 - (c) Derive Laplacian filter (size 3x3) in spatial domain. List out various applications which exhibit the use of Laplacian filter. **07**
- OR**
- (c) Describe the following transfer functions that can be applied on digital image. **07**
 1. Contrast stretching using piecewise linear functions
 2. Contrast stretching using Power law transfer function
- Q.3**
- (a) Briefly describe various applications of image subtraction technique. **03**
 - (b) Briefly describe the following properties of 2-D Fourier Transform: Translation; Rotation **04**
 - (c) How does adaptive filter differ from the regular routine filters for noise reduction in digital image? Describe in detail the working of adaptive median filter. **07**
- OR**
- Q.3**
- (a) Derive Laplacian filter in Frequency domain. **03**
 - (b) Differentiate briefly between spatial and frequency domain work of image enhancement. **04**
 - (c) Describe in detail the working of adaptive local noise reduction filter. How does adaptive filter differ from the normal filter? **07**
- Q.4**
- (a) Describe the working of averaging (smoothing) filter in spatial domain. **03**
 - (b) Describe various scaling techniques to bring the intensity values within the specified range of gray levels (i.e. 0 to 255 for 8-bit image). **04**
 - (c) List out various sharpening filters. Describe the working principle of any one sharpening filter. **07**

OR

- Q.4** (a) Briefly describe the digital image acquisition using sensor-strip. Give suitable examples of applications where this system of acquisition is used. **03**
- (b) What is called edge enhancement? Describe the edge enhancement technique in spatial domain. **04**
- (c) Define histogram. Draw histograms of various digital images like bright, dark, poor contrast and high contrast. Bring out the significance of histogram equalization. **07**
- Q.5** (a) Differentiate between adaptive filters and regular filters. **03**
- (b) Evaluate the statement: “A high pass filter can be constructed from two low pass filters or by subtracting the low pass filter from unity”. **04**
- (c) Evaluate the statement – “Successive use of Erosion and Dilation (two Morphological operations) is used for the removal of unwanted information from digital image”. **07**
- OR**
- Q.5** (a) Explain the working principle of midpoint filter for eliminating the noise from the given image. **03**
- (b) Evaluate the statement: Although there are areas of overlap, image enhancement is largely a subjective process, while image restoration is an objective process. **04**
- (c) With the help of suitable example, explain the Hit-or-Miss transformation method of Morphological image processing technique. **07**
