

GUJARAT TECHNOLOGICAL UNIVERSITY**BE - SEMESTER-VI (NEW) EXAMINATION – SUMMER 2023****Subject Code:3162009****Date:14-07-2023****Subject Name:Machine Vision****Time:10:30 AM TO 01:00 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.

MARKS

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|------------|---|-----------|
| Q.1 | (a) Differentiate briefly between spatial and frequency domain work of image enhancement. | 03 |
| | (b) With the help of graphical representation explain Match-Band effect in image processing. | 04 |
| | (c) Explain various filters, which are used for removal of salt and pepper noise from the image. | 07 |
| Q.2 | (a) Briefly describe various applications of image subtraction technique. | 03 |
| | (b) Evaluate the statement: “Gray level slicing does not always compress the 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.
1. Contrast stretching using piecewise linear functions
2. Contrast stretching using Power law transfer function. | 07 |
| Q.3 | (a) List out the steps to be followed for the image enhancement in frequency domain. | 03 |
| | (b) Differentiate between band pass and band reject filter with graphical representation. | 04 |
| | (c) Describe in detail the working of adaptive local noise reduction filter. How does adaptive filter differ from the normal filter? | 07 |
| | OR | |
| Q.3 | (a) Explain the working of Ideal high pass filter for image enhancement. | 03 |
| | (b) Derive Laplacian filter in Frequency domain. | 04 |
| | (c) Explain order statistics (nonlinear) filters with an example. | 07 |
| Q.4 | (a) Explain the logical operations AND and OR, which are performed on a digital image. | 03 |
| | (b) Explain the relative redundancy and compression ratio of a digital image in context of image compression. | 04 |
| | (c) Briefly explain coding redundancy in context of digital image compression. | 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) 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) 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) Justify the statement: Both the size and coefficients of smoothing filter are significant for blurring the digital image. **03**
- (b) Describe briefly the morphological operation of boundary extraction. **04**
- (c) With the help of suitable example, explain the Hit-or-Miss transformation method of Morphological image processing technique. **07**
- OR**
- Q.5** (a) Explain the working principle of midpoint filter for eliminating the noise from the given image. **03**
- (b) Explain the working principle of alpha-trimmed mean filter for eliminating the noise from the given image. **04**
- (c) Explain the effect of checker board and false contouring in digital image. Also discuss the cause of their occurrences in a digital image. **07**
