

GUJARAT TECHNOLOGICAL UNIVERSITY**BE - SEMESTER-VI EXAMINATION – SUMMER 2025****Subject Code: 3161604****Date: 28-05-2025****Subject Name: Image Processing****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

- Q.1**
- | | | |
|------------|--|-----------|
| (a) | Define the term: Radiance, Luminance, Brightness | 03 |
| (b) | Summarize working of median filter with suitable data. | 04 |
| (c) | Articulate the applications of various components of Electro Magnetic spectrum | 07 |

- Q.2**
- | | | |
|------------|--|-----------|
| (a) | Discuss difference between low pas and high pass spatial filtering | 03 |
| (b) | Illustrate bit plane slicing with its applications. Write down the bit planes for following 4-bit image: | 04 |

11	2	5
7	8	3
4	10	1

- | | | |
|------------|--|-----------|
| (c) | Use following image to find the mean and variance. | 07 |
|------------|--|-----------|

2	1	3	3
1	0	3	3
0	0	7	9
9	5	0	0

What information we get given the mean and variance of the image?

OR

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|------------|----------------------------------|-----------|
| (c) | Sketch various properties of DFT | 07 |
|------------|----------------------------------|-----------|
- Q.3**
- | | | |
|------------|--|-----------|
| (a) | Explain with applications: Log transformation, Power law transformation | 03 |
| (b) | Explain average filter and also list its limitations. How to overcome the limitations of average filter. | 04 |
| (c) | Articulate the difference between edge and boundary. Discuss various masks to extract boundary from image. | 07 |

OR

- Q.3**
- | | | |
|------------|--|-----------|
| (a) | Write a short not on Butterworth low pass filter. | 03 |
| (b) | Summarize with formula and example: Euclidean distance, Chess board distance | 04 |
| (c) | Explain Harmonic and Contra harmonic filters. | 07 |

- Q.4**
- | | | |
|------------|--|-----------|
| (a) | Illustrate alpha trimmed mean filter with example | 03 |
| (b) | Infer how gradient is useful to detect the discontinuity in image | 04 |
| (c) | Use suitable example and explain following: Region spitting and region merging | 07 |

OR

- Q.4** (a) Discuss Euclidean, city block and chess board distance with suitable examples. **03**
(b) Summarize working of Hough transform. **04**
(c) Solve following problem instance using Huffman coding and find average code length. $\langle a_1, a_2, a_3, a_4, a_5, a_6 \rangle = \langle 0.2, 0.3, 0.08, 0.15, 0.02, 0.25 \rangle$ **07**

- Q.5** (a) Discuss RLE compression algorithm. **03**
(b) Differentiate: Image enhancement vs. Image Restoration **04**
(c) Write a note on Geometric mean and contra harmonic mean filters. **07**

OR

- Q.5** (a) Discuss temporal redundancy in image. **03**
(b) Write a short note on multi resolution expansion. **04**
(c) Explain: CMY and RGB color models **07**
