

GUJARAT TECHNOLOGICAL UNIVERSITY**BE - SEMESTER–VIII (NEW) EXAMINATION – SUMMER 2024****Subject Code: 2181102****Date:18-05-2024****Subject Name: Fundamentals of 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.

- Q.1**
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|-----|--|-----------|
| (a) | Explain the basic processes involved in generation of digital image. | 03 |
| (b) | Explain structure of human eye and discuss human vision system | 04 |
| (c) | Explain spatial filtering mask for low pass filtering(smoothing) and Filtering (sharpening) in detail. | 07 |

- Q.2**
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|-----|--|-----------|
| (a) | Explain procedure for Image sampling and quantization. | 03 |
| (b) | What is an image averaging? Discuss an application of the same. | 04 |
| (c) | What is image histogram? Explain Histogram equalization process in detail. | 07 |

OR

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|-----|--|-----------|
| (c) | Explain salt and pepper noise in detail. How to remove salt and pepper noise | 07 |
|-----|--|-----------|

- Q.3**
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|-----|--|-----------|
| (a) | Explain the gamma correction technique for image enhancement | 03 |
| (b) | Explain bit plane slicing in detail. | 04 |
| (c) | Explain homomorphic filtering with block diagram | 07 |

OR

- Q.3**
- | | | |
|-----|--|-----------|
| (a) | Write expressions for conversion of HSI to RGB. | 03 |
| (b) | Explain the following spatial filters (1) Derivative filter (2) Laplacian filter | 04 |
| (c) | Explain region growing by pixel aggregation technique in detail. | 07 |

- Q.4**
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|-----|--|-----------|
| (a) | Explain the process of edge detection using gradient operators | 03 |
| (b) | Explain wavelet based image compression technique. | 04 |
| (c) | Explain global and local thresholding in image segmentation. | 07 |

OR

- Q.4**
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|-----|---|-----------|
| (a) | Compare: Wiener filtering and inverse filtering. | 03 |
| (b) | Prove that dilation and erosion are duals of each other with respect to set complementation and reflection. | 04 |
| (c) | Explain HIT-MISS transformation with example. | 07 |

- Q.5**
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|-----|---|-----------|
| (a) | Discuss 2D Discrete Fourier Transform with the help of equations | 03 |
| (b) | What is the difference between image enhancement and image restoration? Explain image degradation model | 04 |
| (c) | Explain JPEG Compression standard in detail | 07 |

OR

- Q.5**
- | | | |
|-----|---|-----------|
| (a) | Explain Noise probability density function for Gaussian noise and | 03 |
|-----|---|-----------|

impulse noise.

- (b) What are different ways of region based segmentation? Explain anyone with an example. **04**
- (c) Explain contrast stretching with suitable example **07**
