

GUJARAT TECHNOLOGICAL UNIVERSITY**BE - SEMESTER-VI EXAMINATION – SUMMER 2025****Subject Code: 3164201****Date: 20-05-2025****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) What are the main components of an image processing system?	03
	(b) Discuss the differences between binary and grayscale images.	04
	(c) Discuss the process of image formation, including how light and the electromagnetic spectrum contribute to the creation of digital images.	07
Q.2	(a) Define the role of arithmetic operations in image enhancement.	03
	(b) Explain the differences between spatial domain and frequency domain techniques in image enhancement.	04
	(c) Explain Image sharpening using spatial filters.	07
	OR	
	(c) Explain Image smoothing in frequency domain using Low-pass frequency domain filter.	07
Q.3	(a) What is the goal of image enhancement?	03
	(b) Define Histogram of an image and explain its applications.	04
	(c) What are the steps involved in image restoration using frequency domain filtering, and how are Fourier transforms and Wiener filters applied?	07
	OR	
Q.3	(a) What are the applications of smoothing filters in image enhancement?	03
	(b) What is the purpose of using low-pass filters in the frequency domain?	04
	(c) Explain various Noise models.	07
Q.4	(a) What is image restoration?	03
	(b) Explain Gaussian noise and its impact on image quality.	04
	(c) Describe the wavelet transform and explain how it is used for image decomposition and analysis in the context of multi-resolution processing.	07
	OR	
Q.4	(a) What are the basic types of noise in images?	03
	(b) Discuss the differences between spatial and frequency domain filtering for image restoration.	04
	(c) Compare and contrast image pyramids and wavelet transforms as techniques for multi-resolution image analysis.	07
Q.5	(a) What are the main goals of image compression?	03
	(b) Describe the RGB color model and explain its significance in digital image processing.	04
	(c) What is boundary detection in image segmentation, and how does it differ from edge detection?	07

OR

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| Q.5 | (a) | What is lossy compression? | 03 |
| | (b) | What is the HSV (Hue, Saturation, Value) color model, and how is it different from the RGB model? | 04 |
| | (c) | Discuss different methods used for edge detection in image segmentation and how they identify discontinuities in intensity. | 07 |
