Enrolment No./Seat No_____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE- SEMESTER– VII EXAMINATION – SUMMER 2026

Subject Code:3171109 Date:20-05-2026

Subject Name: Digital Image and Video Processing

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.**

			MARKS
Q.1	**(a)**	What is the 4-neighborhood of a pixel in a digital image?	**03**
	(b)	Describe the types of sensors in image acquisition systems.	**04**
	(c)	Explain the different applications of digital image processing in medical imaging, remote sensing, and automated inspection. Discuss the benefits and challenges in each field.	**07**
Q.2	**(a)**	What is the difference between linear and order-statistics filters?	**03**
	(b)	How does histogram specification differ from histogram equalization?	**04**
	(c)	Define Intensity transformation. What is Image Negative? What is Log transformation in DIP? What is Power-Law (Gamma) transformation in DIP?	**07**
		OR	
	(c)	Discuss the design and application of frequency domain filters such as low-pass and high-pass filters. How do they affect image enhancement and noise reduction?	**07**
Q.3	**(a)**	What is color complement, and how is it used in image processing?	**03**
	(b)	Briefly explain how sharpening techniques can be applied to color images.	**04**
	(c)	Describe the RGB, YUV, and HSI color models in detail. Discuss their applications and advantages in digital image processing.	**07**
		OR	
Q.3	**(a)**	What is the basic idea behind region-based segmentation?	**03**
	(b)	What is global thresholding? How does it work in separating objects from the background?	**04**
	(c)	Explain in detail the process of edge linking and boundary detection in digital image processing. How do techniques like Hough Transform help in this process?	**07**
Q.4	**(a)**	What is the uncertainty principle in the context of the Fourier Transform?	**03**
	(b)	Briefly describe the key features of the continuous wavelet transform (CWT) and its applications.	**04**

	(c)	Describe the concept of wavelet bases and multi-resolution analysis (MRA). How does MRA help in analyzing images at different levels of detail?	**07**

OR

Q.4	**(a)**	What is inter-pixel redundancy in image compression?	**03**
	(b)	Describe the main idea behind transform coding in lossy image compression.	**04**
	(c)	Discuss the JPEG and JPEG-2000 compression standards in detail. Compare their techniques, advantages, and areas of application.	**07**
Q.5	**(a)**	What is inter-frame redundancy in video coding?	**03**
	(b)	Explain the concept of forward and backward motion prediction in video compression.	**04**
	(c)	Compare the MPEG and H.26X video coding standards in detail. Discuss their key features, compression techniques, and areas of application.	**07**

OR

Q.5	**(a)**	What is shot boundary detection in temporal segmentation?	**03**
	(b)	Explain the difference between hard-cuts and soft-cuts. How can each be detected?	**04**
	(c)	Discuss the challenges involved in video segmentation, especially in handling complex scenes, varying lighting conditions, and multiple moving objects.	**07**

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