Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

ME – SEMESTER I (NEW) – • EXAMINATION – SUMMER 2016

Subject Code: 2714104 **Date:19/05/2016**

Subject Name: Digital Image 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.**

Q.1	**(a)**	Explain histogram matching with necessary equations.	**07**
	(b)	Given an image of size 3 x 3 as f(m,n) as below. Find the output image g(m,n) using logarithmic transformation g (m,n) = c $\log_{10}$ (1 + f(m,n)), by choosing c as 1) c = 1 and 2) c = L/($\log_{10}$ (1 + L)). Take L = 255. Round the g(m,n) to a number to the next larger integer.	**07**

f(m,n) = [128 212 255; 54 62 124; 140 152 156]

Q.2	**(a)**	Define 2-D DFT and IDFT. List all properties of 2-D DFT.	**07**
	(b)	Explain image sharpening using frequency domain filters.	**07**
		OR	
	(b)	Explain image smoothing using frequency domain filters.	**07**
Q.3	**(a)**	Discuss the noise models in the image in details.	**07**
	(b)	Prove that a 3 x 3 mean filter in the frequency domain which behaves like a low pass filter.	**07**
		OR	
Q.3	**(a)**	Filter the following image, f(m,n), using a 3 x 3 neighborhood averaging by assuming the pixel replication.	**07**

f(m,n) = [1 2 3 2; 4 2 5 1; 1 2 6 3; 2 6 4 7]

	(b)	Discuss restoration in the presence of noise by spatial filtering.	**07**
Q.4	**(a)**	Show that a linear, spatially invariant degradation system with additive noise can be modeled in the spatial domain as the convolution of the degradation function with an image followed by the addition of noise.	**07**
	(b)	Explain Wiener Filtering with its significance	**07**
		OR	
Q.4	**(a)**	Write short note on canny edge detection algorithm	**07**
	(b)	Explain Morphological operators.	**07**
Q.5	**(a)**	Write short on gray-scale morphology	**07**
	(b)	Explain segmentation using morphological watersheds	**07**
		OR	
Q.5	**(a)**	Write short note on digital watermarking	**07**
	(b)	List the image processing applications and explain object recognition.	**07**

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