Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE – SEMESTER–VIII • EXAMINATION – SUMMER • 2014

Subject Code: 182006 **Date: 27-05-2014**

Subject Name: Machine Vision

Time: 10.30 am - 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. **Draw neat diagrams. Shabbily drawn diagrams may not be awarded any credit.**

Q.1	**(a)**	What are the basic gray level transformations available, which can be applied on gray scale digital images? Bring out the importance of each transformation in brief with the help of its graphical representation and relevant practical application.	**7**
	(b)	What is the effect of high pass and low pass filters on digital image? Give suitable practical examples of it.	**7**
Q.2	**(a)**	"Image subtraction is used in various fields such as medical application, finding out defective product for quality control in manufacturing firm and edge extraction of an object" – Justify the statement. Support your answer with suitable relevant examples and critical reasoning.	**7**
	(b)	Explain in brief the responsible parameters deciding the quality of a digital image.	**7**
		OR	
	(b)	Evaluate the statement in context of human vision system: "Objects that appear brightly colored in daylight, when seen by moonlight appear as colorless forms".	**7**
Q.3	**(a)**	Derive Laplacian filter in spatial domain. Bring out the concept of image enhancement using Laplacian filter in spatial domain.	**7**
	(b)	Describe histogram equalization process for image enhancement point of view. Support your answer with mathematical formulation and relevant graphical representation.	**7**
		OR	
Q.3	**(a)**	Show that the 2-D Discrete Fourier Transform can be computed by successive computations of two 1-D Discrete Fourier Transform one after the other, one for all rows and the other for all columns.	**7**
	(b)	What behavior can be expected for an adaptive local noise reduction filter, if the additive noise present in the image is other than salt-and-pepper noise? Support your answer with mathematical formulation of expected behavior of filter and assumption/s made for the same clearly indicating the basis for that assumption.	**7**
Q.4	**(a)**	Describe and differentiate between band pass and band reject filters used in frequency domain for image restoration. Support your answer with the neat schematic diagrams of these filters.	**7**
	(b)	Briefly explain the working of following order statistics filters used for noise removal in digital image: Median filter, max filter, min filter, midpoint filter, alpha-trimmed filter	**7**
		OR	
Q.4	**(a)**	Give step by step procedure to identify and estimate the noise parameters associated with digital image processing. Comment on the procedure to identify and estimate the noise parameter present in the given images of Figure 1.	**7**
	(b)	"Periodicity cannot be ignored when working in frequency domain for image processing" – Explain with the help of suitable example and neat graphical representation.	**7**

Q.5 **(a)** Explain with suitable illustrative method the dilation process used on binary digital image. Give practical application of dilation process in which actual input image is considered as binary image. **7**

(b) Briefly discuss the following logic operations based on morphology: **7**
NOT, AND, OR, XOR, NOT-AND

OR

Q.5 **(a)** Describe the erosion process used on binary digital image with suitable illustration. Give practical application of erosion process in which actual input image is considered as binary image. **7**

(b) Evaluate the following statements: **7**

1. Less value of cut-off frequency for ideal high pass filtering produces smaller objects solid white.
2. Character recognition using machine perception is not handled by high pass filtering.

(a) Image of Akshardham Temple

(b) Image of flowers

Figure 1. Digital Images for Question 4(a)-(OR)

****