Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–VIII (NEW) EXAMINATION – WINTER 2018

Subject Code: 2181102 **Date: 15/11/2018**

Subject Name: Fundamental Of 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.**

			MARKS
Q.1	**(a)**	Which parameter is responsible for low resolution of digital image? Justify your answer.	**03**
	(b)	Monochrome image is having dimension of 3x2 sq. inch and resolution of 300 dpi. What is the memory required to store this image without compression?	**04**
	(c)	Explain matrix representation of digital image. Write equation to find out number of bits required to store digital image. Find storage requirements in Kbyte for the following images. (1) Size 512x512, 8 bits/pixel (2) Size 800x600, 512 gray levels (3) Size 1024x768, color image 24 bits/pixel	**07**
Q.2	**(a)**	An object 15 cm wide imaged with sensor of size 8.8x6.6 mm from distance of 70 cm. what should be required focal length?	**03**
	(b)	Explain components of human visual system.	**04**
	(c)	Explain process of up sampling and down sampling with suitable example with reference to digital image interpolation.	**07**
		OR	
	(c)	What is difference between contrast stretching and histogram equalization? Explain how to obtain histogram of given digital image and histogram equalization algorithm.	**07**
Q.3	**(a)**	What is relative data redundancy R and compression ratio C? What is the mathematical relationship between R and C?	**03**
	(b)	What type of data redundancies that can be identified and exploited for digital image compression purpose?	**04**
	(c)	Explain importance of digital image compression. What digital image compression algorithm used in JPEG & JPEG-2000 standard? Explain any one digital image compression standard.	**07**
		OR	
Q.3	**(a)**	What are the reasons for false contouring in digital images?	**03**
	(b)	Gray level Image is quantized with 8 bit. Part of this image 4x4 is given below. Find out negative image of this 4x4 part. $\begin{bmatrix} 150 & 100 & 100 & 150 \\ 75 & 25 & 25 & 75 \\ 30 & 100 & 100 & 30 \\ 0 & 255 & 255 & 0 \end{bmatrix}$	**04**
	(c)	What is the requirement of frequency domain filtering? Write 3x3 mask for low pass filtering in spatial domain and draw image of mask used for ideal low pass filtering in frequency domain.	**07**

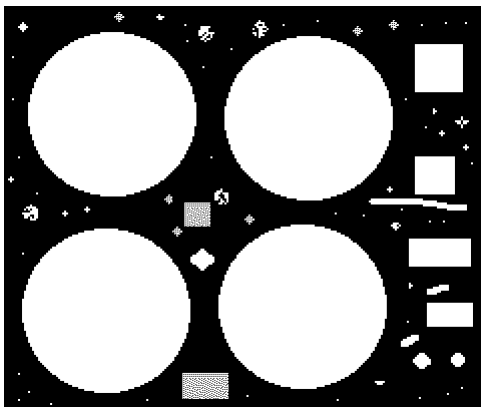
Q.4	**(a)**	Explain the term "Safe web colors".	**03**
	(b)	Explain power-law transformation and its application for image processing.	**04**
	(c)	Explain Canny edge detection algorithm. Why Canny Edge detector performance is superior compared to other edge detection techniques?	**07**

OR

Q.4	**(a)**	What are the reasons for image degradation?	**03**
	(b)	Explain image degradation and restoration model with diagram.	**04**
	(c)	Explain optimum global thresholding using Otsu's method for image segmentation.	**07**
Q.5	**(a)**	Explain pseudo color image processing	**03**
	(b)	Explain conversion from HSI to RGB color model.	**04**
	(c)	What is importance of morphological image processing? Explain process of Erosion and Dilation with example and mathematical equations.	**07**

OR

Q.5	**(a)**	What is the difference between arithmetic mean filter and geometric mean filter?	**03**
	(b)	Express affine matrix for rotation and translation operations.	**04**
	(c)	In following digital image, there are different objects like circles, rectangles, squares, dots and other perturbations. We would like to have only circles in output digital image. Explain suitable image processing technique for this task. Explain this technique with mathematical equations.	**07**



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