Seat No.: _____ Enrolment No.

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–VIII (OLD) EXAMINATION – SUMMER 2019

Subject Code: 181102 **Date: 15/05/2019**

Subject Name:Fundamentals of 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.**

Q.1 **(a)** Explain limitations of human visual system with examples. When you enter in a dark room on a bright day, it takes an appreciable interval of time before you can see well enough to find your empty seat. Which visual process is responsible for this situation? **07**

(b) Explain sampling and quantization to generate digital image. How quality of digital image depends on number of samples and number of bits used for quantization? **07**

Q.2 **(a)** What are the methods to enhance digital image to get more sharpness? Explain any one method with implementation algorithm. **07**

(b) Digital image captured by camera is having Salt and Peeper noise. Which digital image processing method is suitable to remove Slat and Peeper noise? Explain algorithm of suitable method for it. **07**

OR

(b) Digital image captured by camera is having motion blur. Explain image processing algorithm to minimize motion blur, **07**

Q.3 **(a)** What is histogram? Explain histogram equalization algorithm. Equalize following histogram so that equalized image has all gray levels from 0 to 7. **07**

Grey level	0	1	2	3	4	5	6	7
No. of pixels	50	40	60	50	0	0	0	0

(b) Explain difference between spatial domain filtering and frequency domain filtering for digital image processing. 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**

OR

Q.3 **(a)** Suppose that a image is subjected to histogram equalization. Show that a second pass of histogram equalization will produce exactly the same result as the first pass with one example. **07**

(b) What is contrast stretching? Draw piece-wise linear input-output characteristics with corner points (0,0) (50,50) (150,100) (200,200) and (255,255). Determine the output for following input image. **07**

40	110	120	160
80	220	240	80
0	255	255	0
225	175	225	175

Q.4	**(a)**	Explain need of digital image compression. Explain how digital image compression is achieved with DCT followed by LZW coding.	**07**
	(b)	Explain importance of edge detection in image segmentation. Explain gradient operators. Write Prewitt and Sobel edge detection mask.	**07**
		OR	
Q.4	**(a)**	Explain edge linking with Hough transform.	**07**
	(b)	For which situation RGB and CMY color model is not suitable. Explain HSI color model and conceptual relationship between HSI and RGB color model.	**07**
Q.5	**(a)**	Explain different types of structuring elements used for erosion and dilation morphological operations used for digital image processing. How a structure element is chosen for morphological operations?	**07**
	(b)	Explain algorithm for Midpoint filtering and Contra-harmonic filtering. Which filtering performs better in presence of uniform noise?	**07**
		OR	
Q.5	**(a)**	What is thresholding? Explain optimum global thresholding using Otsu's method for image segmentation.	**07**
	(b)	What is region growing with reference to digital image processing? Explain basic region growing algorithm based on 8-connectivity.	**07**

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