

GUJARAT TECHNOLOGICAL UNIVERSITY**BE - SEMESTER– VII (New) EXAMINATION – WINTER 2019****Subject Code: 2173210****Date: 03/12/2019****Subject Name: Digital 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) How do you define and distinguish regions and boundary in an image? **03**
- (b) What are the applications of imaging in Microwave and Infrared band? **04**
- (c) List out various applications of digital images. **07**

- Q.2**
- (a) Show Euclidian distance with an example. **03**
- (b) Define 4- connectivity, 8-connectivity and m-connectivity with an example. **04**
- (c) Consider the following 4 bit 4x4 image segment and perform the low pass filtering using 3x3 average mask. Also discuss what changes will happen to the image. Consider all border pixels are padded with intensity value 1. **07**

$$\begin{bmatrix} 1 & 1 & 7 & 2 \\ 2 & 10 & 3 & 10 \\ 5 & 12 & 4 & 11 \\ 4 & 2 & 10 & 15 \end{bmatrix}$$

OR

- (c) Explain Histogram equalization with its importance in image processing. **07**
- Q.3**
- (a) What is Power-Law transformation? What is its application? **03**
- (b) What is bit plane slicing? Elaborate. **04**
- (c) How do you perform filtering process in frequency domain? Show step by step process with clear diagram. **07**

OR

- Q.3**
- (a) Briefly show the sampling process of digitization. **03**
- (b) Discuss arithmetic addition and subtraction operation on the image. **04**
- (c) Explain Image degradation and restoration process. **07**
- Q.4**
- (a) How do you compare Image enhancement vs Image restoration? **03**
- (b) Derive laplacian operator for high pass filtering and show its application. **04**
- (c) Discuss Gaussian, Rayleigh and Uniform noise. **07**

OR

- Q.4 (a) Define convolution and its purpose. **03**
(b) How do you compute the Fourier Magnitude and Phase angle? **04**
Also list its importance.
(c) How image restoration is performed in frequency domain? **07**
Elaborate.
- Q.5 (a) Define Segmentation. Also list out its applications. **03**
(b) Highlight the differences between RGB and HIS color model. **04**
(c) What is lossy image compression? Discuss any lossy compression **07**
scheme.

OR

- Q.5 (a) Briefly explain image segmentation by thresholding. **03**
(b) Briefly discuss on color segmentation. **04**
(c) Show edge detection with vertical and horizontal edge detection **07**
filters with suitable example.

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