

GUJARAT TECHNOLOGICAL UNIVERSITY
ME - SEMESTER-1 (NEW) EXAMINATION – WINTER 2018

Subject Code: 3710506**Date: 04/01/2019****Subject Name: Advance 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 mark.

- Q.1 (a)** Enlist the applications of image processing and explain any one application. **07**
(b) Apply contrast stretching technique on 3-bit gray level image of size 4 x 4 **07**
 .Write the output image intensity.

2	1	2	1
4	5	5	6
3	2	1	4
6	2	1	6

- Q.2 (a)** Define Histogram of an image. Explain Histogram equalization and normalization. **07**
(b) Define the following morphological operations for binary images: **07**
 (i)Erosion (ii)Dilation (iii)Opening (iv)Closing (v) Hit or Miss transform (vi) Minkowski's operator for erosion (vii) Minkowski's operator for dilation

OR

- (b)** Histograms of two images A & B are given. **07**
 $p_A(l) = \{ 0.25, 0.25, 0.25, 0.25 \}$
 $p_B(k) = \{ 0, 0.5, 0.5, 0, 0 \}$
 Match the histogram of image A to that of image B.
 Give the gray level assignment in image A.

- Q.3 (a)** Define the following first order edge detection operators: **07**
 (i)Basic edge detection operators (ii)Roberts (iii)Prewitt (iv)Sobel
(b) Write a short note on Canny edge detection operator. **07**

OR

- Q.3 (a)** What are the invariant properties required for feature extraction ? Explain. **07**
(b) Let an ellipse be defined as **07**
 $(x/a)^2 + (y/b)^2 = 1$.

Prove that the image curvature of the ellipse is given by
 $K(t) = ab/(a^2 \cos^2 t + b^2 \sin^2 t)^{3/2}$

- Q.4 (a)** Write a short note on Harris Corner detector. **07**
(b) Write a short note on Scale Invariant Feature Transform(SIFT). **07**

OR

- Q.4 (a)** Write a short note on Hough transform for circles. **07**
(b) Explain discrete dual contour space in shape matching technique. **07**
Q.5 (a) How moment describes shape's layout. Explain different moments in details **07**
(b) Define cumulative angular function to describe image curve and explain. **07**

OR

- Q.5 (a)** Describe Image Processing in 3D. **07**
(b) Explain Algebraic Reconstruction method to solve the density problem in reconstruction of tomography image. **07**
