## **GUJARAT TECHNOLOGICAL UNIVERSITY** ME – SEMESTER-1 (NEW) EXAMINATION – WINTER 2016

Subject Code: 2710506 Subject Name: Advanced Image Processing Time: 2:30 pm to 5:00 pm Instructions:

**Total Marks: 70** 

Date:04/01/2017

- 1. Attempt all questions.
- 2. Make suitable assumptions wherever necessary.
- 3. Figures to the right indicate full marks.
- Q.1 (a) For the input image and structuring element shown in figure, perform the 07 region filling operation.





Structuring Element

- (b) Explain (1) Homomorphic filter and (2) Gaussian Low pass filter in the 07 frequency domain.
- Q.2 (a) By discussing the drawbacks of histogram equalization, explain histogram or specification in brief. Perform the histogram specification for the 8x8 image shown in Table-1

|            | Table-1   |   |    |    |   |    |    |    |   |  |
|------------|---|---|----|----|---|----|----|----|---|--|
|            | Grey level  | 0 | 1  | 2  | 3 | 4  | 5  | 6  | 7 |  |
|            | Number of pixels                                  | 8 | 10 | 10 | 2 | 12 | 16 | 4  | 2 |  |
| The target | histogram is given as shown in Table-2<br>Table-2 |   |    |    |   |    |    |    |   |  |
|            | Grey level  | 0 | 1  | 2  | 3 | 4  | 5  | 6  | 7 |  |
|            | Number of pixels                                  | 0 | 0  | 0  | 0 | 20 | 20 | 16 | 8 |  |

(b) State the advantages and disadvantages of second order edge detector operators 07 for Low level feature extraction. How it is overcome by Marr-Hildreth operator?

OR

- (b) How Hough transform is better for shape based feature extraction compare to Template matching approach? Explain the Hough transform for detection of line and circle.
- Q.3 (a) How curvature detection is different than the edge detection? Explain various 07 curvature detection techniques in brief.
  - (b) Explain the importance of 3D data set for medical image analysis. How the 07 data set can be sliced for analysis?

| Q.3 | <b>(a)</b> | Explain the Area based approach for image motion detection. By identifying drawbacks briefly explain differential approach. |    |  |  |  |
|-----|------------|---|----|--|--|--|
|     | <b>(b)</b> | Define boundary and regions. How chain code can be made rotation invariant?   | 07 |  |  |  |
| Q.4 | (a)        | Explain K-Nearest Neighborhood rule for cluster classification.   | 07 |  |  |  |
|     | <b>(b)</b> | What is Active Contour? Define greedy algorithm for detection of snakes.  | 07 |  |  |  |
|     |            | OR  |    |  |  |  |
| Q.4 | (a)        | Explain Algebraic Reconstruction method to solve the density problem in the reconstruction of tomography image.             | 07 |  |  |  |
|     | <b>(b)</b> | What is Texture? Explain different Texture Descriptor techniques in brief.  | 07 |  |  |  |
| Q.5 | <b>(a)</b> | What is the region descriptor? Explain the basic region descriptor.   | 07 |  |  |  |
|     | <b>(b)</b> | Write the difference between volume imaging and sections.   | 07 |  |  |  |
|     |            | OR  |    |  |  |  |

- Q.5 (a) Explain Canny Edge detection operator in detail. Derive its advantages over 07 conventional edge detection operators.
  - (b) Define the concept of Fourier Descriptor for describing the objects. How it **07** possesses the shift invariant property?

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