Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER– • EXAMINATION – WINTER 2014

Subject Code: 182006 Date: 25/11/2014

Subject Name: Machine Vision

Time:02.30pm – 05.00pm Total Marks: 70

Instructions:

1. **Attempt all questions.**
2. **Make suitable assumptions wherever necessary and clearly mention the same.**
3. **Figures to the right indicate full marks.**
4. **Draw neat diagrams. Diagrams with inferior quality may not be awarded credit.**

Q.1 **(a)** Explain the applications of digital image processing in the following fields. **7**

1. Space and satellite field
2. Medical field

(b) Describe the concept of brightness discrimination using the theory of weber ratio. **7**

Q.2 **(a)** Illustrate image acquisition using: **7**

1. Single sensor
2. Sensor strip
3. Sensor array

(b) With the help of block diagram describe fundamental steps in digital image processing. **7**

OR

(b) Explain the effect of value of cut-off frequency on ringing effect in high pass filtering in frequency domain. Draw necessary graphs for explanation. **7**

Q.3 **(a)** Explain the following distance measuring functions between pixels of digital image. **7**

1. Euclidean distance
2. D_4 or city clock distance
3. D_8 or chessboard distance
4. D_m distance

(b) Describe the following transfer functions that can be applied on digital image. **7**

1. Contrast stretching using piecewise linear functions
2. Contrast stretching using Power law transfer function

OR

Q.3 **(a)** Evaluate the statement: "Gray level slicing cannot compress the digital image, but bit plane slicing significantly compresses the digital image." **7**

(b) With the help of suitable example, explain the Hit-or-Miss transformation method of Morphological image processing technique. **7**

Q.4 **(a)** Explain various filters, which are used for removal of salt and pepper noise from the image. Also evaluate that these filters are prone to generate blurring in case of multiple passes of filtering. **7**

(b) Explain the working of Laplacian filter for image enhancement in spatial domain. Give suitable examples of the images which can be enhanced for further processing using Laplacian filtering. **7**

OR

Q.4 **(a)** Compare and contrast between local and global enhancement of a digital image. Explain the filters which work on the principles of local and global enhancement. **7**

(b) Compare and contrast between unsharp masking and high boost filtering. Support you answer with suitable examples and explanation. **7**

Q.5 **(a)** How does adaptive filter differ from other regular filters for noise reduction in digital image? Describe in detail the working of adaptive local noise reduction filter. **7**

(b) Describe a complete digital image filtering process, in which illumination and reflectance components of the image are separated out for further image processing. **7**

OR

Q.5 **(a)** Evaluate the statement: "Periodicity cannot be ignored, when working with convolution process in frequency domain." **7**

(b) Explain the following filters: **7**

1. Band pass filter
2. Band reject filter
3. Notch filters

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