



UNIVERSITY OF RUHUNA

Faculty of Engineering

Mid-Semester 7, Examination in Engineering - Part II, June 2014

Module No: EE7239 Module Name: Computer Vision and Image Processing

[One hour and thirty minutes]

[Answer all questions. Each question carries 5 marks]

- Q1. a) How do you convert an analog image in to a digital one? Explain the methods you use. [1 Mark]
- b) What is meant by Pixel Replication in zooming Digital Images? [0.5 Marks]
- c) What is the Dynamic Range of an image? [0.5 Marks]
- d) In image smoothing median filter gives better results than averaging filter for an image with salt and pepper noise. Is this statement true? Explain your answer. [1 Mark]
- e) i) Assume 8-connectivity for Figure Q1 (e). Scan pixels from left to right and top to bottom and perform component labeling. Use Figure Q1 (e) (1) and Figure Q1 (e) (2) in last the page of this paper to perform component labeling. Identify the connected components in the given 10x10 pixel image. Indicate a black pixel with a clear cross sign.
Note: Detach the last page of the paper with Figure Q1 (e) (1) and Figure Q1 (e) (2) and attach it to your answer script.
- ii) What difference would it make for the answer to question Q1 (e) (i) if you used 4-connectivity?

[2 Marks]

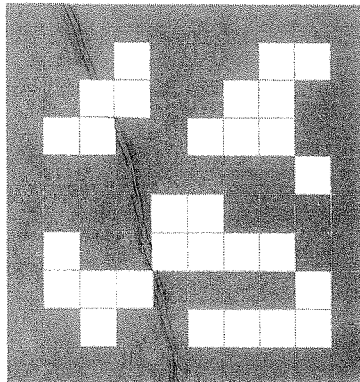


Figure Q1(e)

- Q2. a) Draw the skeleton for the following areas. (Use the fire travelling method)
- a square region
 - a circular region
 - a triangular region
 - the white region given in figure Q2 (a)

[1 Mark]

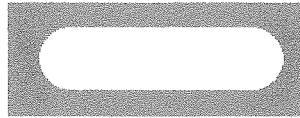


Figure Q2(a)

- Skeletonization can be used in shape matching. List down two measures we can extract from a skeleton. [0.5 Marks]
- If the pixels in an image are reordered, will there be any change in the histogram? Explain your answer. [0.5 Marks]
- Histogram processing can be used to double the size of an image. Is this statement true? Explain your answer. [1 Mark]
- A 4x4 pixel image uses three bits to represent each gray level. The frequency distribution of the image is given in figure Q2 (e).
 - Draw the histogram of the image.
 - Perform histogram equalization on the image.
 - What is the improvement you achieved for this image after histogram equalization?

[2 Marks]

1	0	1	2	3	4	5	6	7
f(i)	2	8	2	4	0	0	0	0

Figure Q2(e)

- Q3. a) What is intensity slicing? [0.5 Marks]
- Plot the transformation functions to decrease the intensity of a color image by 40% in RGB and HSI colour models. [1.5 Marks]
 - Why do you use a logarithmic transformation in applying the Fourier transform for images? [1 Mark]
 - State one application of a low-pass filter.
 - Sketch the filter radial cross section diagrams for an Ideal low-pass filter and Butterworth low-pass filter.
 - What is the best filter for the application you provided in Q3(d)(i) among the Ideal low-pass filter and Butterworth low-pass filter? Give reasons for your answer. [2 Mark]

Reg. No:

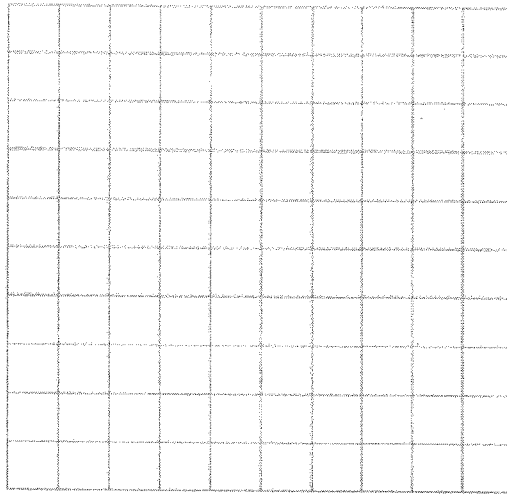


Figure Q1(e)(1)

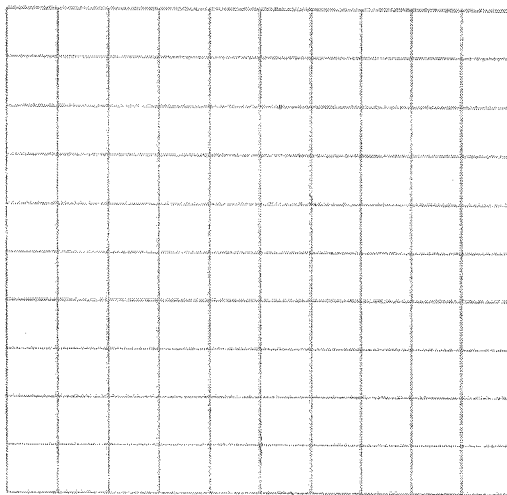


Figure Q1(e)(2)