Modern Academy
for Engineering and Technology in Made
Computer Engineering and Information
Technology Department

Academic Year : 2016/2017
Semester : Fall
Exam Date : 12-Jan-2017

QUESTIONS FOR FINAL TERM WRITTEN EXAM

Subject:: Digital Image Processing (CMP432)

Spec.: 5th Computer

Examiners: Dr. Sabry M. Abdel- Moiety

Time : 3 Hours

Attempt All Questions | **Number of Questions: 5** | **Number of Pages: 2**

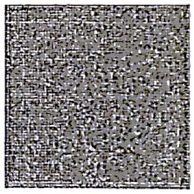
Question 1 (25 points):

1- **For the image shown do the following:**
   - What is the best filter to smooth the image
   - How to bluer the image using a suitable filter
   - Use the best filter to reduce the noise for the image
2- Write a mat lab program to perform the above 3 filter's

Question 2 (25 points):

1- Draw a diagram to show the Stages in Digital Image Processing, explain briefly each stage

2- **For the given lena image 255 x 255 x 8 bpp, Write a mat lab program to do the following:**
   - Sample and quantize the image with acceptable resolution
   - Double zoom the image
   - Flip the image with angle +45
   - Get the histogram for the image
   - Negate the image
   - Make histogram equalization for that image



Question 3 (25 points):

1- **For the Logarithmic Transformations (s = c * log(1 + r))**

   - When we use that kind of the transformation
   - Deduce the output image after the transformation
   - Draw a histogram before and after the transformation

5	9	0	2	6	6
6	12	15	14	9	8
1	8	12	14	10	8
1	3	1	4	2	7
1	0	9	6	2	7
0	3	6	1	11	0

2- **Define the following terms:**

- Image Acquisition	- Pixel intensity
- Image sensing	- Pixel neighbourhood
- Adaptive Thresholding	- Bit Plane Slicing
- Spatial Domain	- Frequency Domain
- Edge detection	- Basic Global Thresholding
- Lossy and lossless compression	- Digital image processing

Question 4 (25 points):

1- **For image Enhancement (Smoothing – sharpening):**

- **Image enhancement (Spatial domain):**
  - What is the best filter can be used to enhance the image, why

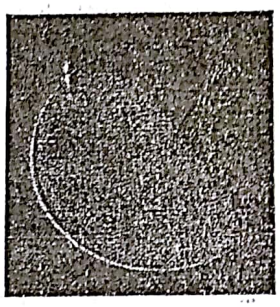
Sobel filter

-1	0	1
-2	0	2
-1	0	1

Laplacian of Gaussian (LOG)

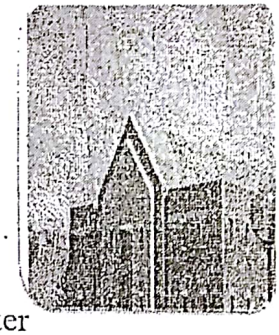
-1	-1	-1
-1	9	-1
-1	-1	-1

  - Write a mat lab program to enhance this image using your best filter



- **Image Sharpening (Frequency domain):**
  - Draw frequency domain filtering operation's diagram And explain briefly each block
  - What is the best filter for the given image (Low pass filter- High pass filter, explain why
  - Write a mat lab program to implement sharping using your Best filter

2- **For image Segmentation:**



- What is the best filter can be used to detect all kind of edges for the image

Canny

+1	+2	+1
0	0	0
-1	-2	-1

LOG

0	-1	0
-1	4	-1
0	-1	0

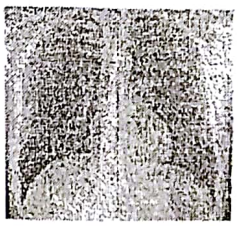
-1	-1	-1
-1	8	-1
-1	-1	-1

- Write a mat lab program to implement detection process using your best filter

Question 5 (25 points):

1- **For the compression Process:**
   - Perform Lossless image compression using Huffman coding for the matrix shown
   - Derive What is Compression Ratio – RMSE – For the compression process

0	0	1	1	2
0	1	1	2	4
1	1	2	4	5
1	3	4	5	6
3	3	5	6	7



2- Draw a Discreet cosine transform diagram, Explain each block, write a mat lab program to perform the DCT Lossy compression

****Note : RMSE = For every pixel in the image (SQRT $(x_2-x_1)^{\wedge 2} - (y_2-y_1)^{\wedge 2}$ and PSNR = 1 / RMSE**

GOOD LUCK

Modern Academy
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Computer Engineering and Information
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Academic Year : 2016/2017
Semester : Winter
Exam Date : 22-Jan-2017

QUESTIONS FOR FINAL TERM WRITTEN EXAM

Subject: : Digital Image Processing (E451)

Spec.: 4th Computer

Examiners: Dr. Sabry M. Abdel- Moiety

Time : 3 Hours

Attempt All Questions | **Number of Questions: 5** | **Number of Pages: 2**

Question 1 (25 points):

The following matrix is taken from a specific image:-

0	0	1	1	2
0	1	1	2	4
1	1	2	4	5
1	3	4	5	6
3	3	5	6	7

Find out the equalized histogram gray levels for the image

Question 2 (25 points):

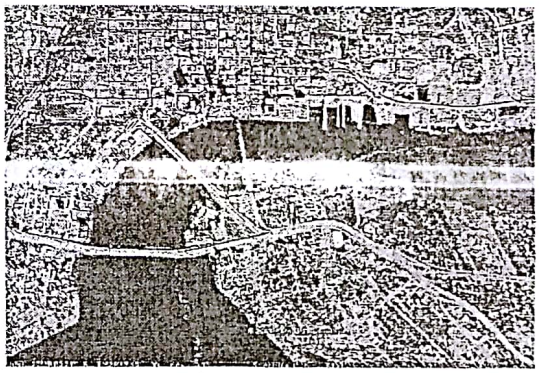
1- Clarify the following terms:

- Image Contrast - Sampling
- Contrast Stretching - Digital Image processing
- Quantization - Spatial Domain
- Lossy Compression - Frequency Domain
- Image Filtering - Intensity level
- Adaptive Thresholding - Edge Detection

2- List two methods to enhance contrast and clarify the difference.

Question 3 (25 points):

0	0	1	1	2
0	1	1	2	4
1	1	2	4	5
1	3	4	5	6
3	3	5	6	7



1- For the above image (5x5 3 BPP) derive the following:

- ✓ Image size
- ✓ Lossless image compression using Huffman Coding

2- Show a diagram that explain how to comperes the shown image using DCT, explain each step

Question 4 (25 points):

1- Draw a Fundamental components in digital image processing diagram, Explain briefly each Component.

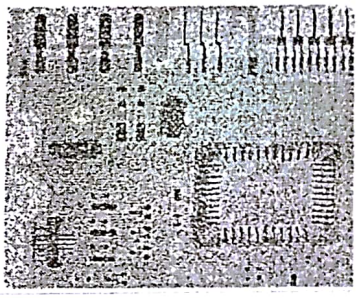
2- What is the main components of an Image Processing System

Question 5 (25 points):

For the following image

1- Using Image toolbox utilities how to enhance the image shown, explain why?

2- How to use Segmentation Techniques to detect edges



GOOD LUCK