Digital Image Processing set-1
Mid Semester Exam

Instructions

1. This is a **closed book online proctored** exam.

    a. You should not refer to books, notes or online resources.
    b. You should not discuss questions or answers with anyone (including outsiders)
    c. You should have your camera and microphone **ON** at at all times and no headphones

2. Write the solutions clearly and legibly in A4 sheets, using pen (NOT pencil) and at the end of the exam you should submit the scanned copy of your solutions as explained by the faculty
3. Follow all other instructions given by the faculty during the exam.

Objective Questions (1 Mark each)

1. Which of the following rays/waves of EM spectrum is the most energetic ray/wave?

    A. X-rays
    B. Ultraviolet rays
    C. Visible rays
    D. Gamma rays
    E. Microwaves

2. Which of the following is not a field of X-ray band?

    A. Astronomy
    B. Radar
    C. Industry
    D. Medical diagnoses
    E. Crystallography

3. Environmental conditions monitoring is one of the major application of

    A. Radio wave imaging
    B. Thermal imaging
    C. Multi-spectral imaging
    D. Ultraviolet imaging

E. Gamma ray imaging

4. The number of bits required to store an image of size 7×7 and 1024 gray values is

A. 590
B. 460
C. 580
D. 441
E. 490

5. Which of the following tools is used for geometric correction

A. Sampling
B. Quantization
C. Interpolation
D. Extrapolation
E. Filters

6. How many points required for the Bicubic Interpolation?

A. 0
B. 2
C. 4
D. 8
E. 16

7. The inverse log transform maps

A. A narrow range of low gray-level values in the input image into a wider range of output values.
B. A narrow range of low gray-level values in the input image into a narrow range of output values.
C. A wider range of low gray-level values in the input image into a narrow range of output values.
D. A wider range of low gray-level values in the input image into a wider range of output values.
E. None of the above

8. The process to correct the power-law response phenomena is called

A. Gamma correction

B. Beta correction
C. Alpha correction
D. Pie correction
E. None of the above

9. The aim of contrast stretching is to

A. transform high contrast image into a low contrast image
B. transform dark image into a light image
C. decrease dynamic range of the gray levels in the image being processed
D. increase dynamic range of the gray levels in the image being processed
E. None of the above

10. The drawback of smoothing filter is that it can

A. blur noisy pixels
B. sharp the edges
C. blur edges
D. remove noise
E. remove sharp transitions

11. The first-order derivative of an image is negative at

A. constant intensity
B. ramp
C. intensity transition
D. step
E. None of the choice

12. The filter attenuates high frequency while passing low frequencies of an image is

A. Unsharp-mask filter
B. High-pass filter
C. Low-pass filter
D. Zero-phase-shift filter
E. None of the above

13. The filter used in frequency domain corresponding to the low-pass filter in spatial domain is

A. Unsharp mask filter
B. High-boost filter

C. Gaussian filter
D. Butterworth filter
E. None of the above

14. The Contraharmonic mean filter reduces the salt noise for the value of Q

A. Greater than 0
B. Less than 0
C. Greater than 1
D. Less than 1
E. None of the above

15. Which of the following statements are correct?

A. Noise is independent of spatial coordinates
B. Noise is dependent of spatial coordinates
C. Noise is uncorrelated with respect to the image
D. All of the above mentioned
E. None of the above

Descriptive Questions (5 Marks each)

1. Consider the image of size 5 by 5 given below where the highest gray-level value is 7. Also take the Laplacian filter and Low pass filter given below

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

Image

0	1	0
1	-4	1
0	1	0

Laplacian filter

0.01	0.1	0.01
0.1	0.56	0.1
0.01	0.1	0.01

Low pass filter

Compute the following:

a) The output of the given Laplacian filter at (3,3)

b) The output of the given low pass filter at (3,3)
c) The histogram of the whole image
d) The output of the histogram equalization at (3,3)

2. Write a short note on 2D DFT and 2D IDFT. Give some of the properties of 2-D DFT. Write down the steps of filtering in frequency domain.
3. What is adaptive median filtering? Why it is used? Write an algorithm for adaptive median filtering.