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Name of Examination : **Winter 2020** - (Preview)

Course Code & Course Name : **IN401 - Digital Image Processing**

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Maximum Marks : **60**

Duration : **3 Hrs**

[Edit](#) [Print](#) [View Answer Key](#) [Close](#) **Answer Key Submission Type:** Marking scheme with model answers and solutions of numerical

Instructions:

1. All questions are compulsory.
2. Illustrate your answer with suitable figures/sketches wherever necessary.
3. Assume suitable additional data; if required.
4. Use of logarithmic table, drawing instruments and non programmable calculators is allowed.
5. Figures to the right indicate full marks.

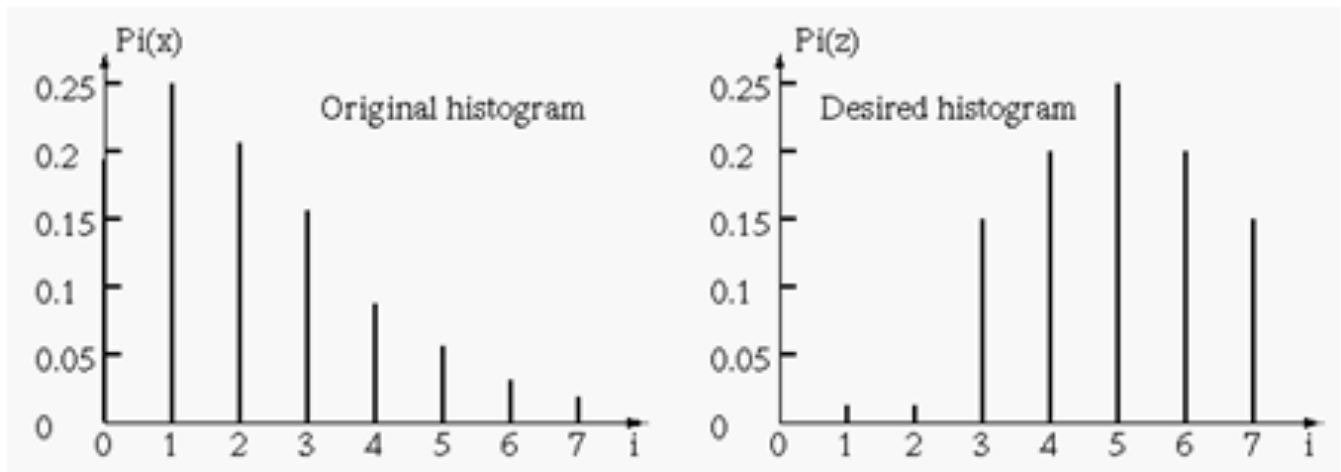
1) Answer / Define the following

- I. How many number of bytes are required to store a 512×512 image with 256 gray levels ? [2]
- II. Assuming that a 10 m high structure is observed from a distance of 20 m. What is the size of an image in a pin hole camera ? Assume that the distance between the lens and imaging camera is 17 mm. [2]
- III. Power spectrum of an Image [2]
- IV. Spatial Resolution [2]
- V. Fourier transform of a Impulse signal [2]
- VI. Region and Boundary of an image [2]

2) Answer the following questions

- a) Explain how to represent Digital Image? Enlist the methods used for image acquisition in Digital image processing. [6]
- b) Suggest the gray level transformation function for mapping a narrow range of low gray-level values in the input image into a wider range of output levels. Draw and Explain the characteristics curve for the same function. [6]

3) a) Define the steps to obtain the mapping function for the specified Histogram of an image. The histogram of the given image and the histogram desired are shown below: [6]
Obtain the Histogram of the resulting image by mapping



b) Obtain the filter mask to implement the Laplacian filter on an image. What are the application of Laplacian filter used in Image processing ? [6]

OR

b) Suggest the Mask / Filter for removal of salt and pepper noise in spatial domain .Explain how the mask is implemented on given image ? [6]

4) Solve any two of the following questions

- a) What do you understand by the frequency of an image? Explain the basic steps for filtering in frequency domain. [6]
- b) Describe the equations for 2 Dimensional Discrete Fourier transform for an image. Prove the frequency shifting property of the Fourier transform. [6]
- c) Smoothing (Blurring) is achieved in the frequency domain by attenuating specific range of high frequency components in the transform of a given image. Justify the statement with suitable filter function. [6]

5) Solve any two of the following questions

- a) Write a model for Image Degradation Process. Indicate the various types of Noises along with their Probability density function. [6]
- b) Define the image compression. Differentiate variable length coding with fixed length coding. [6]
- c) What is the significance of image segmentation? Explain the concept of line detection technique used in image segmentation . [6]

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