Objective Type

Q. No.1. [20]

i. The duration that excited phosphor takes to emit all its energy in the form of light is called ________________.

ii. A ________________ is produced by extending the outer boundaries of each of the two lines until they meet.

iii. The process of filling an area with a rectangular pattern is called _____.

iv. __________ characters such as j and f typically extend beyond their character body limits.

v. A ______________ transformation moves object without deformation.

vi. When the scaling along both Euclidian axes is equal, the transformation is called _______________ scaling.

vii. ______________ are involved in scotopic or dim light vision and responsible for general overall picture.

viii. ______________ ratio is used as a subjective measure for brightness discrimination of an individual.

ix. _______________ is used to correct image intensity developed and displayed on different devices.

x. Euler’s theorem states that $e^{j\theta} = __________________$

xi. The phase angle of the Fourier transform is defined as ________________

xii. A ______________ filter is one that does not change the phase of the signal.

xiii. A ______________ filter is a filter with a constant function and a hole at the center.

xiv. Multiplication of an image by a constant would somewhat _____________ the brightness.

xv. Boundary extraction can be achieved by means of the equation $B(A) =$

xvi. A high boost filtered image is obtained by adding ________________ to the input image multiplied by a constant A.

xvii. At u=0, and v=0, the 2D DFT represents the __________ of the image in spatial domain

xviii. A 16 bit bitmap having a spatial resolution of 320 X 480 pixels would have a size of ___________ Kilobytes

xix. Using a lookup table of 16 bit to compute additions of a constant to an image would be ___________ than applying the operator on each pixel if the image is a 16 bit bitmap having 300 x 300 pixels.

xx. A raster scan display system having a resolution of 640 x 480 capable of displaying 8bit colors would require a frame buffer of at least __________ Megabytes.
Attempt four questions out of seven questions from the subjective section.

Subjective Type

Q. No.2
i. Define any 4 of the following terms
   - 4-adjacency
   - 8-adjacency
   - M-adjacency
   - Chessboard distance
   - Pixel replication                     [12]

ii. Draw the diagram for the refresh scan CRT as well as label the important components explaining their functionality. [4]

iii. Differentiate between raster and random scan display system highlighting the advantages and disadvantages of both. [4]

Q. No.3
i. What is the effect of applying histogram equalization on an image the second time? Justify? [3]

ii. Explain the data structures and the algorithms required to undo a histogram specification. [4]

iii. Derive the second derivative (laplacian) operator and show its spatial filter for a 4-neighbor as well as 8-neighbor. [4]

iv. What is histogram specification? Write down the pseudo code to implement histogram specification. Assume and identify all required data structures as well as operations. [9]

Q. No.4
i. Explain the 2D – Discrete Fourier transform and narrate the algorithm to compute the 2D-DFT of an image of dimensions m x n [10]

ii. Draw the diagram as well explain the implementation details of any two of the following:
   - Ideal low pass filter
   - Butterworth low pass filter
   - Gaussian low pass filter [10]

Q. No.5
i. Briefly explain the following
   - Erosion
   - Dilation
   - Boundary Extraction. [12]

ii. Show how the hit or miss transform is better in locating objects as compared to AND-ing. Demonstrate by example. [8]

Q. No.6
i. Explain the scan line polygon fill algorithm and identify as well as treat the special cases. [8]

ii. Briefly explain the following algorithms for line drawing
   - Digital differential Analyzer
   - Bresenham Line drawing algorithm [12]
Q. No.7
   i. Describe aliasing as well as the different anti-aliasing methods. [10]
   iii. Briefly narrate the different line attributes as well as their possible values. [6]

Q. No.8
   i. Write a note on any 3 of the following [15]
      - General Pivot point rotation
      - General fixed point scaling
      - Reflections
      - Shears

   ii. Derive a composite matrix for the following steps of operations applied to any shape: [5]
      - Rotation of 30 degrees clockwise about the x-axis
      - Translation of (-3,0)
      - Scaling by a factor of (1,3)