PARUL UNIVERSITY
FACULTY OF ENGINEERING & TECHNOLOGY
B.Tech. Summer 2021- 22 Examination

Semester: 8   Date: 28/03/2022
Subject Code: 203113481   Time: 10:30 am to 01:00 pm
Subject Name: Digital Image Processing for Mechatronics   Total Marks: 60

Instructions:
1. All questions are compulsory.
2. Figures to the right indicate full marks.
3. Make suitable assumptions wherever necessary.
4. Start new question on new page.

Q.1 Objective Type Questions - (Fill in the blanks, one word answer, MCQ-not more than five in case   **(15)**
of MCQ) (All are compulsory) (Each of one mark)
   1. At what points, a continuous image is digitized?
      a) Vertex
      b) Sampling
      c) Contour
      d) Random
   2. What is the next step in image processing after compression?
      a) Wavelets
      b) Segmentation
      c) Representation and description
      d) Morphological processing
   3. When is the contrast stretching transformation a thresholding function, for r and s as gray-value
      of image before and after processing respectively?
      a) r1 = s1 and r2 = s2
      b) r1 = r2, s1 = 0 and s2 = L – 1, L is the max gray value allowed
      c) r1 = 1 and r2 = 0
      d) None of the mentioned
   4. Given an intensity level [0, L-1] with "r" and "s" positive values, how will the negative of an
      image obtain?
      a) s = L - 1 - r
      b) s = L - 1 + r
      c) s = L + 1 - r
      d) s = L + 1 + r
   5. A second order derivative operator can be defined as _____.
      a) Gaussian
      b) Histogram
      c) Laplacian
      d) None of the above
   6. 64 x 64 image has resolution of _____.
   7. Dilation followed by erosion is known as _____.
   8. _____ is known as the highlighting the contribution made to total image by specific bits
      instead of highlighting intensity-level changes.
   9. If f(x,y) is an image function of two variables, then how the second order derivative of a one-
      dimensional function, f(x) can be defined.
   10. Define Brightness.
   11. Blurring an image with the help of a smoothing filter may lead to noise reduction.
       a) True   b) False
   12. Write the expression to find the number of bits to store a digital image?
   13. Define the term: Image
   14. State the condition of transformation function s=T(r)
   15. Define Mask or Kernels.

Q.2 Answer the following questions. (Attempt any three)   **(15)**
   A) Explain opening and closing operation with an example.
   B) Mention and prove for any two properties of Fourier transform.
   C) What is image enhancement? Mention the different types of image enhancement.
   D) Explain dynamic range, Match band phenomenon, and Simultaneous Contrast.

Q.3 A) Apply histogram concept and equalize it for below mention table. **(07)**

Intensity	0	1	2	3	4	5	6	7	Total
# Pixels	20	5	25	10	15	5	10	10	100

B) Explain the concept of image restoration with block diagram. **(08)**

OR

B) Explain in detail with an example for min, max and medial filter. Also compare median filter with averaging filter. **(08)**

Q.4 A) What is high pass filter in frequency domain and describe in details for its types with mathematical expression. **(07)**

OR

A) Write a brief with mathematical expression about translation, reflection, dilation and erosion of morphological operations. **(07)**

B) Explain procedure for Image sampling and quantization. **(08)**