Seat No: _____ **Enrollment No: _____**

PARUL UNIVERSITY

FACULTY OF ENGINEERING & TECHNOLOGY

B. Tech. Summer 2021-22 Examination

Semester: 8 **Date: 28-03-2022**
Subject Code: 03107451 **Time: 10:30am to 01:00pm**
Subject Name: Digital Image Processing **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 **(15)**

1. Intensity range of 8-bit pixel image is ……to……...
2. DFT stands for …….
3. The harmonic mean filter works well for……..…..but fails for pepper noise.
4. Two pixels p and q with values from V are 4-adjacent if q is in the set …….
5. A process that expands the range of intensity levels in an image so that it spans the full intensity range of the recording medium or display device is known as……..
6. The ……is measure of displacement of various sinusoids with respect to their origin.
7. To map a narrow range of low gray-level input image into a wider range of output levels, we use……..transformation.
8……is called automatic image enhancement technique.
9. Thinning operation is used to remove the ……..pixels.
10. .....is to subdivide an image into its component regions or objects.
11. Edge detection in images is commonly accomplished by performing a spatial …….. of the image field.

a) Smoothing Filter b) Integration
c) Differentiation d) Min Filter

12. Image compression is

a) Making image look better b) Sharpening the intensity-- transition regions
c) Minimizing degradation over image d) Reducing the redundancy of the image data

13. In image processing technique the input and output are

a) Low quality image and improved quality image b) Description and image
c) Image and description d) Low quality image and image/description.

14. Sampling of an image is required for

a) Quantization b) Sharpening
c) Smoothing d) Digitization

15. Amount of energy an observer perceives from a light source

a) Radiance b) Luminance
c) a & b d) None of the Above

Q.2 Answer the following questions. (Attempt any three) **(15)**

A) Define the following terms: Digital image, Pixel, Spatial resolution, Gray level resolution (Intensity Resolution), and False contouring.

B) Explain Power-Law transformations. What is gamma correction?

C) Draw the block diagram of image enhancement in frequency domain and explain in brief.

D) Write a short note on all-system-safe colours/ safe RGB colours.

Q.3 A) Enlist point processing techniques used for image enhancement. Explain two techniques in detail. **(07)**

B) The intensity distribution of a 3-bit image of size 64×64 pixels is given below: **(08)**

r_k	r_0	r_1	r_2	r_3	r_4	r_5	r_6	r_7
n_k	790	1023	850	656	329	245	122	81

Where r_k is a K^{th} intensity level & n_k is the number of pixels that have intensity level r_k. The image has integer intensity levels in the range [0, 7]. Equalize the histogram of the image.

OR

B) Write a short note on Dilation and Erosion Morphological operations and explain applications of each. **(08)**

Q.4 A) Explain the process of edge detection using gradient operators. What is the advantage of using Sobel operator? **(07)**

OR

A) Explain arithmetic coding procedure with appropriate example. What type of redundancy is removed by the arithmetic coding? **(07)**

B) Define image restoration. Discuss reasons for the degradation of digital image. Explain image degradation-restoration model with equations in Spatial and frequency domain. **(08)**