

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT

TEST -3 EXAMINATION- 2024

B.Tech-VIII Semester (CSE/IT/CE)

COURSE CODE(CREDITS): 21B1WEC731 (3)

COURSE NAME: Digital Image Processing using Python

COURSE INSTRUCTORS:Dr. Nishant Jain

MAX. MARKS: 35

MAX. TIME: 2 Hour

Note: (a) All questions are compulsory.

(b) Marks are indicated against each question in square brackets.

(c) The candidate is allowed to make Suitable numeric assumptions wherever required for solving problems

Consider the following images A and B for the questions in which reference to images A and B is mentioned: (It is given that both the images are in uint8 format)

A=

100	200	40	40	100
100	200	40	40	100
200	30	30	100	80
200	50	50	100	80
100	50	50	100	80

B=

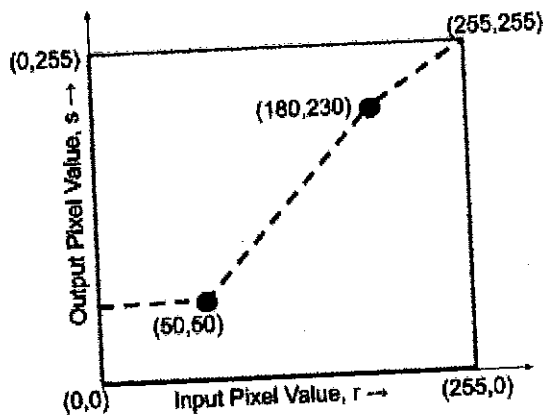
1	1	1	0	0	0
1	1	1	0	0	0
1	1	1	0	0	0
1	1	1	0	0	0
1	1	1	0	0	0

- Q1. Describe a real-world scenario where image subtraction is a valuable tool, and explain how subtracting one image from another can be used to reveal useful information in applications like surveillance, medical imaging, astronomy, or remote sensing. [3]CO2
- Q2. When an image is captured in low-light conditions, what type of image transformation curve should be used to boost the contrast and make the image contents more visible? Support your answer by drawing a labeled transformation curve. [4]CO2
- Q3. What is Bit-Plane Slicing, and how does it enable steganography by hiding information within an image by selectively modifying specific bits of the image's pixel values? [4]CO2

Q4. Explain the difference between Temporal Averaging and Spatial Averaging in image processing, with examples? How are these techniques used to reduce noise and improve image quality? [4]CO2

Q5. Write a template for a horizontal edge detection filter and demonstrate its implementation on image "B" to detect horizontal lines. Show all the relevant steps taken to get the solution. [4]CO2

Q6. Determine the output images obtained on applying the following transformation curves on the given image A:



Q7. With respect to image segmentation, explain how adaptive thresholding differs from traditional thresholding? [4]CO2

Q8. Calculate the Gray Level Co-occurrence Matrix (GLCM) for image B (given on first page) and demonstrate how applying various texture measures (proposed by Haralick) can be used to identify the presence of horizontal lines in the image. [4]CO2

Q9. Design a detailed label architecture for a Convolutional Neural Network (CNN) model, including all the components and layers, and explain the purpose and function of each layer in the network. [4]CO4