

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT

TEST -2 EXAMINATIONS-2022

B.Tech-VIII Semester (CS/IT/Civil/BT)

COURSE CODE: 21B1WEC731

MAX. MARKS: 25

COURSE NAME: Digital Image Processing using Python

COURSE CREDITS: 3

MAX. TIME: 1 Hour 30 Min

*Note: All questions are compulsory. Marks are indicated against each question in square brackets.*

Refer the following image I for all the questions where image I is referred in the paper:

I=

|     |    |    |     |     |
|-----|----|----|-----|-----|
| 120 | 50 | 20 | 50  | 110 |
| 70  | 90 | 50 | 100 | 40  |
| 40  | 60 | 10 | 90  | 70  |
| 60  | 70 | 90 | 100 | 30  |
| 150 | 30 | 60 | 40  | 150 |

Q1. Draw and explain the transformation curve, which when implemented to any input image produces an output image such that all the pixels that lie in the range between 80 and 130 appear the same as original pixel intensity values whereas all the remaining pixel intensity values appear as black. State the application where such a transformation curve can be used.

[3] C02

Q2. Draw the transformation curve,  $T(r)$  having an original intensity values ( $r$ ) and new pixel intensity values ( $s$ ) as given below:

| $r$                | $s$               |
|--------------------|-------------------|
| $0 \leq r \leq 50$ | $0 < s < 20$      |
| $50 < r \leq 100$  | $20 < s \leq 220$ |
| $100 < r \leq 255$ | $220 < s < 255$   |

Determine the output image obtained on implementing the above transformation curve,  $T(r)$  on image I (mentioned at the beginning of the paper)

[1+3=4] C02

Q3. Draw the labeled transformation curve for the following transformation to be applied on an image whose every pixel uses 4 bits for storage:

- a. Identity Transformation
- b. Log Transformation
- c. nth Power Transformation

[1+1+1=3] C02

Q4. Draw the normalized histogram for the image I (mentioned at the beginning of the paper) . Explain the significance of the histogram of an image with respect to the information present in the image.

[2+2=4] C02

Q5. Determine the output image obtained on implementing the following filters on the image I (mentioned at the beginning of the paper):

- a. 5 X 5 average filter
- b. 5 X 5 median filter
- c. 5 X 5 max filter

[3] C02

Q6. Write a Python code to get an equalized histogram of an image.

[2] C03

Q7. Explain one application where image subtraction can be used?

[2] C01

Q8. Determine the number of bits required to store a color image of size 100X100. Given that the image format is uint8.

[2] C01

Q9. Write a short note on the following:

- a. Contrast
- b. Intensity Resolution.

[2] C01