

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT

TEST - 3 EXAMINATION DECEMBER 2021

B.Tech VII Semester

COURSE CODE: 20B1WEC736

MAX. MARKS: 35

COURSE NAME: Image Sensing and Reconstruction

COURSE CREDITS: 03

MAX. TIME: 2 Hours

Note: All questions are compulsory. Assume the data wherever necessary.

- Q1. Explain the process of image sampling and quantization in detail. CO1 [3 Marks]
- Q2. Calculate the total number of bits required for transmission of a digital image of size 1024×1024 with 256 gray levels, if the transmission is accomplished in packets consisting of a start bit and a stop bit. CO2 [3 Marks]
- Q3. State and explain the steps of median filtering. CO2 [3 Marks]
Compute the output of the median filter if $x = \{2 \ 3 \ 4 \ 3 \ 4 \ 5 \ 6\}$ and $w = \{-1 \ 0 \ 1\}$ where x is an array and w is a mask. 0 in w indicates the position from where the filtering starts. CO2 [4 Marks]
- Q4. Perform the discrete convolution on the following image matrices: CO3 [6 Marks]

$$X_1 = \begin{bmatrix} 1 & 4 & 1 \\ 2 & 5 & 3 \end{bmatrix} \text{ and } X_2 = \begin{bmatrix} 1 & 1 \\ 1 & -1 \end{bmatrix}$$

- Q5. Compare between contrast stretching and histogram equalization. CO3[4 Marks]
Equalize the given histogram: CO3[4 Marks]

| Gray Level | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
|------------------|-----|------|-----|-----|-----|-----|-----|----|
| Number of pixels | 790 | 1023 | 850 | 656 | 329 | 245 | 122 | 81 |

- Q6. Explain the mechanism of edge detection in image segmentation using Gradient and Laplacian operators. CO4[4 Marks]
- Q7. Explain the following morphological operations in detail: CO4[4 Marks]
1. Erosion
 2. Dilation
 3. Opening
 4. Closing