

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT

TEST - 3 EXAMINATION JUNE 2022

M.Tech (IoT) II Semester

COURSE CODE (CREDITS): 21M1WEC231(3)

MAX. MARKS: 35

COURSE NAME: Image Sensing and Real Time Processing

COURSE INSTRUCTOR: Dr. Nafis Uddin Khan

MAX. TIME: 2 Hours

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

- Q1.** (a) Explain the process of image sampling and quantization in detail. CO1 [3 Marks]
 (b) 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. CO1 [2 Marks]
- Q2.** (a) Distinguish between point processing and neighborhood processing. CO2 [2 Marks]
 (b) Compute and draw the histogram, normalized histogram and cumulative normalized histogram for the following 4-bit image: CO2 [3 Marks]

5	8	3	7
1	3	3	9
6	8	2	7
4	1	0	9

- Q3.** Perform the discrete convolution on the following image matrices: CO3 [5 Marks]
- $$X_1 = \begin{bmatrix} 1 & 3 & 2 \\ 2 & 5 & 6 \end{bmatrix} \text{ and } X_2 = \begin{bmatrix} 2 & 4 \\ 1 & 3 \end{bmatrix}$$
- Q4.** (a) Explain the concept of Discrete Fourier Transform in image filtering. CO3 [3 Marks]
 (b) Compute Discrete Fourier Transform of 1-dimensional sequence $x[n] = \{0, 1, 2, 1\}$. CO3 [3 Marks]

Q5. Explain the detailed mechanism of edge detection in image segmentation using Laplacian operation. CO4 [5 Marks]

Q6. Explain the use of K-means clustering algorithm in image segmentation with proper example. CO4 [5 Marks]

- Q7.** Considering real time images, define the following morphological operations in detail: CO4 [4 Marks]
1. Erosion
 2. Dilation
 3. Opening
 4. Closing