

MARKING SCHEME

paper code: P119-141 (T1)

OCTOBER 2019 / INSEM (T1)

F. Y. M. TECH. (E&TC) (SEMESTER - I)

COURSE NAME: IMAGE AND VIDEO PROCESSING

COURSE CODE: ETPA11181

(PATTERN 2018:R1)

Time: [1 Hour]

[Max. Marks: 20]

(*) Instructions to candidates:

- 1) Answer Q.1 OR Q.2, Q.3 OR Q.4
- 2) Figures to the right indicate full marks.
- 3) Use of scientific calculator is allowed
- 4) Use suitable data where ever required

Q.1) a) Explain how spatial and gray level resolution are associated with sampling and quantization of the two dimensional signal. **(6)**

Mr. Suresh has pictures captured by his old 0.3MP (640x480 pixels) mobile selfie camera few years back. He now wants to watch the old pictures with 5MP (2560x1920) resolution with good quality as if the picture taken by 5MP front camera. Suggest a suitable technique to achieve this.

Spatial resolution : **2 Marks**

Gray Resolution : **2 Marks**

Suggestion of addition of 2 rows and 2 columns : **1 Mark**

Interpolation technique : bilinear or nearest neighborhood : **1 Mark**

b) Define pixel adjacency in an image. Where the concept of adjacency is used in image processing. How adjacency is different from connectivity. **(4)**

Definition of Adjacency : **1 Mark**

Application in image segmentation : **2 Marks**

Difference with connectivity : **1 Mark**

OR

Q.2) a) A common measure of transmission for digital data is the baud rate, defined as the number of bits transmitted per second. Generally, transmission is accomplished in packets consisting of a start bit, a byte (8 bits) of information, and a stop bit. Using these facts, answer the following: **(6)**

(a) How many minutes would it take to transmit a 1024 X 1024 image with 256 gray levels using a 56K baud modem?

- b) What would the time be at 750 K baud, a representative speed of a phone DSL (digital subscriber line) connection?
- a) The total amount of data (including the start and stop bit) in an 8bit, 1024 x 1024 image, is $(1024)^2 \times [8 + 2]$ bits. The total time required to transmit this image over a
At 56K baud link is $(1024)^2 \times [8 + 2] / 56000 = 187:25$ sec or about 3.1 min **4 Marks**
- b) At 750K this time goes down to about 14 sec. **2 Marks**
- b) Explain in brief any four applications of digital image processing. (4)
Four Applications : **1 Mark Each**

- Q.3) a) Explain the following methods of image enhancement in spatial domain (6)
1) Image Negative **2 Marks**
2) Gamma Correction **4 Marks**
- b) Explain image filtering process using window technique. What are order statistic filters and where they are used? (4)
Explanation of windowing process : **2 Marks**
Order statistic filter : **1 Mark** Application : **1 Mark**

OR

- Q.4) a) Explain how the Laplacian mask is designed? Comment on the resultant image after applying Laplacian? (6)
Design with difference equations : **4 Marks**
Comments : **2 Marks**

b)

OR

- Apply DFT to the following image and prove that this DFT works. (4)

$$A = \begin{bmatrix} 4 & 0 \\ 0 & 0 \end{bmatrix}$$

$DFT(A) = \begin{bmatrix} 4 & 4 \\ 4 & 4 \end{bmatrix}$ **1 Mark** for DFT equation and **3 Marks** for solution.