G.R. No. [ ]

OCTOBER 2018 / IN - SEM (T1)

F. Y. M. TECH. (Signal Processing) (SEMESTER - I)

Image and Video Processing (ETPA11181)

(2018 PATTERN)

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) What is spatial and gray level resolution? What are the **(6)** limitations of the nearest neighborhood and bilinear interpolation. What are false contours?
Spatial resolution – Description and significance – 2marks
Gray level resolution –Description and significance – 2 marks
Limitations of Interpolation : 1 mark
False contour description : 1 mark

b) Explain with suitable example **(4)**
    1) Euclidean Distance
    2) Adjacency

For 1) and 2) Formula for the distance – 1 mark (each) +
Example using pixel at (x,y) and (s,t) with integer coordinates.-1 mark (each).

OR

Q.2) a) The image segment is as shown below. **(6)**
(a) Let $V = \{0, 1\}$ and compute the lengths of the shortest 4, 8, and m-path between pixels p and q. If a particular path does not exist between these two points, explain why?
(b) Repeat for $V = \{1, 2\}$.

        3 1 2 1 **(q)**
        2 2 0 2
        1 2 1 1
    (p) 1 0 1 2

a) No path exist for 4. --1 mark
For 8 path the length is 4 : 1 mark

b) For shortest 4 path length is 6 : 2marks
   For m path it is 4 : 2 marks

b) Explain in brief any four digital image processing techniques. **(4)**
One technique : 1 mark each

Q.3) a) Explain the following methods of image enhancement in **(6)** spatial domain
   1) Image Negative (2 marks)
   2) Power Law Transformation (2 marks)
   3) Bit Plane Slicing (2 marks)

b) Justify the statement median filter is an effective tool to **(4)** minimize salt & pepper noise considering the image.

$$I = \begin{bmatrix} 24 & 22 & 33 & 25 & 22 & 24 \\ 34 & 255 & 24 & 0 & 26 & 23 \\ 23 & 21 & 32 & 31 & 28 & 26 \end{bmatrix}$$

Complete solution using median filter : 4 marks

OR

Q.4) a) What is histogram of a digital image? Explain the process of **(6)** histogram equalization technique used in contrast enhancement of digital images?
Definition of Histogram of an image : 2 mark
Histogram equalization process : 4 marks

b) Explain image filtering process using window technique. **(4)** What are smoothing filters. Where they are used?

Filtering process : 4 marks
Smoothing filters and applications : 1 +1 mark